This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

SIGILLVM · UNIVERSITATIS · CALIFORNIENSIS
FIAT LVX
MDCCCLXVIII
EX LIBRIS

THE OXFORD GEOGRAPHIES

Edited by A. J. Herbertson.

PRELIMINARY GEOGRAPHY. By A. J. Herbertson. Second Edition. 1s. 6d.

JUNIOR GEOGRAPHY. By A. J. Herbertson and R. L. Thompson. Fourth Edition revised, with many new and improved diagrams. 2s. With *Principles of Geography*, 3s. With *Questions and Statistical Appendix*, 2s. 6d. With both, 3s. 6d.

SENIOR GEOGRAPHY. By A. J. Herbertson and F. D. Herbertson. Ed. 3, 2s. 6d. With *Physiographical Introduction*, 3s. 6d. With *Questions and Statistical Appendix*, 3s. With both, 4s.

PHYSIOGRAPHICAL INTRODUCTION TO GEOGRAPHY. Ed. 2 revised, with new diagrams. 1s. 6d.

QUESTIONS ON THE JUNIOR GEOGRAPHY. By F. M. Kirk. With *Statistical Appendix* by E. G. R. Taylor. 1s.

QUESTIONS ON THE SENIOR GEOGRAPHY. By F. M. Kirk. With *Statistical Appendix* by E. G. R. Taylor. 1s.

THE CLARENDON GEOGRAPHY. By F. D. Herbertson. Vol. I, second edition, 3s. Separately: Part I, Principles of Geography; Part II, British Isles; Part III, Europe; 1s. 4d. each. Vol. II, 3s. Separately: Part IV, Asia; Part V, Africa and Australia; Part VI, America; 1s. 4d. each.

PRACTICAL GEOGRAPHY. By J. F. Unstead. 2s. 6d. Separately: Part I, 1s. 6d.; Part II, 1s. 6d.

GEOGRAPHY OF IRELAND. By O. J. R. Howarth. 2s. 6d.

AUSTRALIA. In its physiographic and economic aspects. By Griffith Taylor. 3s. 6d.

AUSTRALIA. A School Geography. By T. G. Taylor.

THE BRITISH EMPIRE. By A. J. Herbertson and R. L. Thompson. 2s. 6d.

COMMERCIAL GEOGRAPHY OF THE WORLD. By O. J. R. Howarth. 2s. 6d.

THE UPPER THAMES COUNTRY AND THE SEVERN-AVON PLAIN. By N. E. MacMunn. 1s. 6d.

THE ELEMENTARY GEOGRAPHIES. By F. D. Herbertson.

Vol. I: A First Physiography. Ed. 2. 1s. Vol. II: In and about our Islands. Ed. 2. 1s. Vol. III: Europe. 1s. Vol. IV: Asia. 1s. 6d. Vol. V: North and Central America and the West Indies. 1s. 6d. Vol. VI: The Three Southern Continents. 1s. 9d. Vol. VII: British Isles. 1s. 9d.

ELEMENTARY GEOGRAPHY OF SCOTLAND. By M. Newbigin. 1s. 6d.

ANIMAL GEOGRAPHY. By M. Newbigin. 4s. 6d.

INTRODUCTION TO PLANT GEOGRAPHY. By M. E. Hardy. 3s. 6d.

THE OXFORD WALL MAPS. Prospectus on application.

August, 1913.

THE OXFORD GEOGRAPHIES

EDITED BY A. J. HERBERTSON

A COMMERCIAL GEOGRAPHY OF THE WORLD

BY

O. J. R. HOWARTH, M.A.

ASSISTANT SECRETARY OF THE BRITISH ASSOCIATION

WITH 33 DIAGRAMS

OXFORD
AT THE CLARENDON PRESS
1913

HF1027
.H7

OXFORD UNIVERSITY PRESS
LONDON EDINBURGH GLASGOW NEW YORK
TORONTO MELBOURNE BOMBAY
HUMPHREY MILFORD M.A.
PUBLISHER TO THE UNIVERSITY

CONTENTS

CHAP. PAGE

I. GENERAL CONSIDERATIONS.
Influence of Climate and Relief on Commerce and Industry. Natural Regions 7
II. COLD REGIONS 20
III. TEMPERATE LANDS.
Physical Conditions. Cereals. Fruits. Animal Products 30
IV. TEMPERATE LANDS (*cont.*).
Forests. Vegetable Fibres. Other Products . 49
V. HOT LANDS.
Food Products. Vegetable Fibres. Forest Products, &c. 58
VI. FISHERIES: ZOOLOGICAL REGIONS 74
VII. MINING AND MANUFACTURES.
Distribution of Minerals. Considerations affecting Distribution of great Industries 81
VIII. TRANSPORT 98
IX. TRADING CENTRES. MIGRATION 133
X. THE GRAIN TRADE AND KINDRED SUBJECTS . . 138
XI. THE BRITISH ISLES.
Districts, Products, Industries, and Communications. Commerce of the United Kingdom, with particular reference to British Imperial Commerce 148
XII. SCANDINAVIA AND RUSSIA 162
XIII. CENTRAL EUROPE 169
XIV. THE EUROPEAN MEDITERRANEAN REGION . . 185
XV. NORTH AMERICA 192
XVI. TEMPERATE LANDS OF THE SOUTHERN HEMISPHERE 200
XVII. THE MONSOONAL AND OTHER ASIATIC TERRITORIES 205
XVIII. THE HOT LANDS IN AFRICA AND AMERICA. PACIFIC ISLANDS 213

STATISTICAL TABLES 222

INDEX 227

283561

LIST OF ILLUSTRATIONS

FIGS. PAGE
1. Natural Regions of the World 13
2. Mean Annual Rainfall (World) 16
3. Vegetation Regions (World) 18
4. Distribution of Occupations (World) 23
5. Distribution of important Food-grains (World) . . . 29
6. Chief Sources of Wheat-supply to the densely populated Areas in Europe and North America 35
7. Northern Limits of some important Cultivated Plants in Europe 37
8. South-eastern Asia, showing Rice-lands and most densely inhabited Lands 61
9. Animal Realms (World) 80
10. Principal Mineral Fields of Central Europe, in relation to the Relief of the Land 83
11. The Congo Valley and its Railways 101
12. The Magdalena Valley and its Railways 103
13. Part of the Oxford Canal 103
14. Navigable Waterways of Central Europe 104
15. The Great Lakes and St. Lawrence 105
16, 17. Types of Ports 115, 117
18. Part of the Coast of Norway 118
19. Commercial Routes from Europe to India, Australia, and the Far East 119
20. Road, Railway, and Canal from Head of Thames to Severn 122
21. Severn Tunnel Routes to South Wales 125
22. Diagram of Main Transcontinental Railways in Western Europe 128
23. Main Railways and Sea-routes of Europe 129
24. Poor Pasture-land in British Isles 151
25. Rich Pasture in British Isles 151
26. Distribution of Cultivated Land in British Isles . . 151
27. Distribution of Wheat in British Isles 151
28. Distribution of Coal in British Isles 152
29. Cotton and Linen Manufactures (British Isles) . . 155
30. Woollen and Silk Manufactures (British Isles) . . 155
31. Iron Ore, Ironworks, and Shipbuilding (British Isles) . 155
32. Towns with over 50,000 Inhabitants (British Isles) . . 155
33. Distribution of Minerals in Central Europe . . . 172

UNIV. OF CALIFORNIA

AUTHOR'S NOTE

I HAVE to express indebtedness to Professor A. J. Herbertson and to Mrs. Herbertson for much help, suggestion, and the loan of maps. The regions of the world, which have been recently worked out by Professor Herbertson, are quoted in their entirety in the first chapter, as it is desirable to establish the connexion between them and the political divisions dealt with in the closing chapters; but no attempt has been made here to give more than an outline of the physical conditions on which they are based. It is a commonplace, but no less a duty, to acknowledge the great utility of Mr. G. G. Chisholm's *Handbook of Commercial Geography*. To Professor H. N. Dickson I owe much, and am particularly grateful for two most suggestive chapters in his *Climate and Weather* (Home University Library: Williams and Norgate). The *Statesman's Year-book* supplies statistics for all countries; official *Statistical Abstracts* are published for the United Kingdom, the British Empire, and Foreign Countries, and the *Annual Statement of the Trade of the United Kingdom* leads further into detail. The *Encyclopaedia Britannica* (11th edition) provides notices on products, industries, and commerce under the headings of the various countries, divisions, and towns, and also in articles on the chief commodities and industries indicates their geographical distribution. The *Britannica Year-book* (1913) gives later particulars. It is unnecessary here to refer to special works consulted.

As to the table in the Appendix giving statistics for various countries, where the import and export figures are stated to be 'generally' based on an average of five years, it should be explained that in a very few cases, from one cause or another, either figures for that term were not obtainable or the average appeared to be so far from representing existing conditions as to be valueless. It appeared unnecessary to specify these cases, as it is hoped that the figures as they stand afford a proper basis for comparison.

CHAPTER I

GENERAL CONSIDERATIONS

Influence of Climate and Relief on Commerce and Industry. Natural Regions.

THE foundation of a knowledge of commercial geography is a knowledge of the different Natural Regions of the World and their products. It is necessary to know where different products are found, and why they are found there. Most products of plant and animal origin depend on the climate of a region. The contrast between the rich vegetation of the hot wet equatorial forest and the bareness of the hot dry desert of the Sahara, or of the icy desert of the polar regions is obvious. On climate depend the distribution of natural vegetation and (in part) of animals in the natural state, and also the ability of man to cultivate certain plants or domesticate certain animals in certain regions. In connexion with climate there have to be considered physical features. The study of land-forms bears not only upon the questions of distribution above mentioned, but especially upon the means of transport. Climate and weather affect also transport, especially by sea. The direction, variability, and strength of the winds determine certain routes, especially of sailing ships. Even on land if the climate is too dry it may be difficult for man to supply himself, his beast of burden or his railway locomotive, with water. The distribution of mineral products does not depend on climate, but man's ability to work a mineral deposit profitably is often dependent on it. For instance, we shall see how difficult mining is in Arctic regions or in the West Australian desert.

Climate obviously affects the distribution of man over the Earth. It also affects his capacity for commerce. For example, one densely inhabited area will be found to contain a population which is devoted to manufacture, not only for home use but for export on a large scale, and imports its chief food-supplies from great distances. Another closely populated region will be found to be practically self-supporting, and to engage in little external trade. For all these reasons a knowledge of natural regions is important, and it has advanced very far beyond the stage at which, only a century and a half ago, it was possible for a French colony in tropical Guiana to fail owing to the want of the simplest necessities of life in a hot country, whereas one of its shops is said to have exhibited pairs of skates for sale. But in later times not a few commercial ventures have failed through neglect of the climatic factor.

Climatic Influences on Industry and Commerce. A temperate climate is better suited to manufacturing and commercial activity than a tropical climate. For example, the native of one of the tropical forest regions is more easily provided by Nature with the simple necessities of life than the native of a temperate region. He can without much effort keep himself warm and fed. Building materials for such shelter as he needs are ready to his hand. He has therefore little or no instinct towards artificial comforts or luxuries, the production of which (or earning the means to purchase them) would involve heavy labour, whereas the tropical climate tends to make him lazy. It was in warm or hot lands that old systems of slavery developed, and we still hear of natives of hot lands being forced by ill-treatment to work.

Tropical heat thus generates slackness, to a greater or less degree, in the natives of hot lands. Therefore we do not generally find among such people great industries organized as they are in temperate lands such as Great Britain, Western Europe, or the Eastern States of North America. It is hoped that in India, under British guidance, but with native labour, manufacturing industries, which have been developed to some extent already, will ultimately be developed on a scale comparable with those of temperate lands ; but if this is done the case will be the first of its kind. Again, tropical climate carries with it danger to the health of immigrants from temperate lands. Therefore great industries have not been established in these lands by large bodies of immigrant workers from temperate lands. It is intended in Australia, where there is a strong desire that only 'whites', and no coloured people, shall settle, to develop the resources of the tropical Northern Territory by means of white immigrants (from temperate lands) entirely. If this experiment is successful it, too, will be the first of its kind. It is disputed whether it can succeed. But, apart from other considerations, it should be remembered that important discoveries have been made of late years as to the prevention of 'tropical' diseases and the preservation of the health of residents in hot lands.

The native of the colder regions, however, must work harder for his food-supply and must build a more or less elaborate house, and the climate not only compels but fits him to do so. Out of the necessity and capacity for labour grow the instinct towards betterment of condition, the conception of the value of labour, and the tendency to specialize in whatever, for the individual or the community, may be its most profitable form. From this last consideration arises the commercial idea, the idea of exchange of products. Commerce is generally taken to signify 'the international exchange of goods'; that is, 'the foreign trade of all countries as distinct from their domestic trade'. This presupposes the production of different commodities in different localities in excess of local requirements. We then find locality A exchanging the surplus of its product *x*, which locality B cannot produce as cheaply if at all, for a supply of B's product *y*, which A cannot produce. The temperate regions of the world have thus become, in one sense, a vast trading community, though this is not true in another sense, because of their political division. The reasons for most wars are traceable, more or less directly according to individual cases, to commercial considerations.

The hot regions in no sense form a commercial community, either among themselves or with the temperate regions. We have seen that there is comparatively little, if any, occasion for commerce between one hot region and another. There is certainly no small amount of commercial exchange on equal terms between temperate and some hot countries. But, broadly speaking, immigrants from the temperate regions have generally either employed the natives as workers for hire, or simply entered the tropical storehouse and helped themselves.

Either extreme of climate limits men to a low scale of civilization and to a humble place in commerce. The natives of the coldest lands are absolutely limited to the hunter's life, and can only win little if anything of a surplus in the way of furs, skins and so forth, to offer in exchange for products of more fortunate countries (chap. ii).

Influence of Relief. The surface features of a land have close relations with its commerce. Elevation affects vegetation and vegetable products; the temperature of the upper parts of a mountain system in hot lands will be similar to that of temperate lands, and their forests and agricultural products therefore similar too (p. 17). The sea and great rivers are highways of communication; mountains, deserts, swamps obstruct it (ch. viii). Within the temperate regions of greatest economic activity the following broad divisions may be made, without, however, drawing strict lines between them: the lowland is the agricultural land, the hilly or piedmont country the seat of the chief mining and manufacturing industries, the mountains that of forestry and pastoral occupations.

Physical Regions of the World. According to the differences of climate and general physical conditions in different parts of the world, it is possible to divide the world into a series of natural regions. Similar regions, which may be grouped together under a single title or type-name, are found in the western and eastern, the northern and southern hemispheres. Such similar regions, possessing certain common characteristics or resemblances in climate and relief, possess also common characteristics in their natural vegetable and animal products, and in the opportunities they afford for cultivation and for commercial development generally. Sometimes also they exhibit peculiar differences. These regions do not correspond with any political divisions. So long, therefore, as we are studying the natural geographical factors controlling commercial products and their use, and the geographical distribution of those products, we shall follow natural divisions, not the artificial political divisions. But as we have to use the political names of countries, we shall be able to see how they are related to the natural regions. So when we come to consider the trade of the principal trading countries, we shall know something of where they stand in the natural scheme.

The following natural regions have been worked out[1] and are illustrated in Fig. 1:—

1. Cold Lands. Types:—
    - 1*a*. Norway.
    - 1*b*. Kamchatka.
    - 1*c*. Tundra.
    - 1*d*. Yukon.
    - 1*e*. Greenland.
2. Cool Lands. Types:—
    - 2*a*. Western Europe.
    - 2*b*. St. Lawrence.
    - 2*c*. Siberia.
    - 2*d*. Baikalia.
    - 2*e*. Tibet.
3. Warm Lands. Types:—
    - 3*a*. Mediterranean.
    - 3*b*. China.
    - 3*c*. Turan.
    - 3*d*. Iran.
    - 3*e*. Mongolia.

4, 5. Hot Lands. Types:—
- 4*a*. Sahara.
- 4*b*. India.
- 4*c*. Sudan.
- 4*d*. East African Plateau.
- 4*e*. Quito.
- 5*a*. Amazon.
- 5*b*. Malay.

With certain exceptions, the letters in the above notation represent broad physical divisions; thus 1*a*, 2*a*, 3*a* are 'western marginal' lands; 1*b*, 2*b*, 3*b* are 'eastern marginal'; *c* represents mainly lowland, *d* highlands or lower plateaus, *e* high mountains and plateaus. These regions are not divided one from another by defined lines. Nature does not often draw a boundary line. They merge one into another; yet

---

[1] By Prof. A. J. Herbertson.

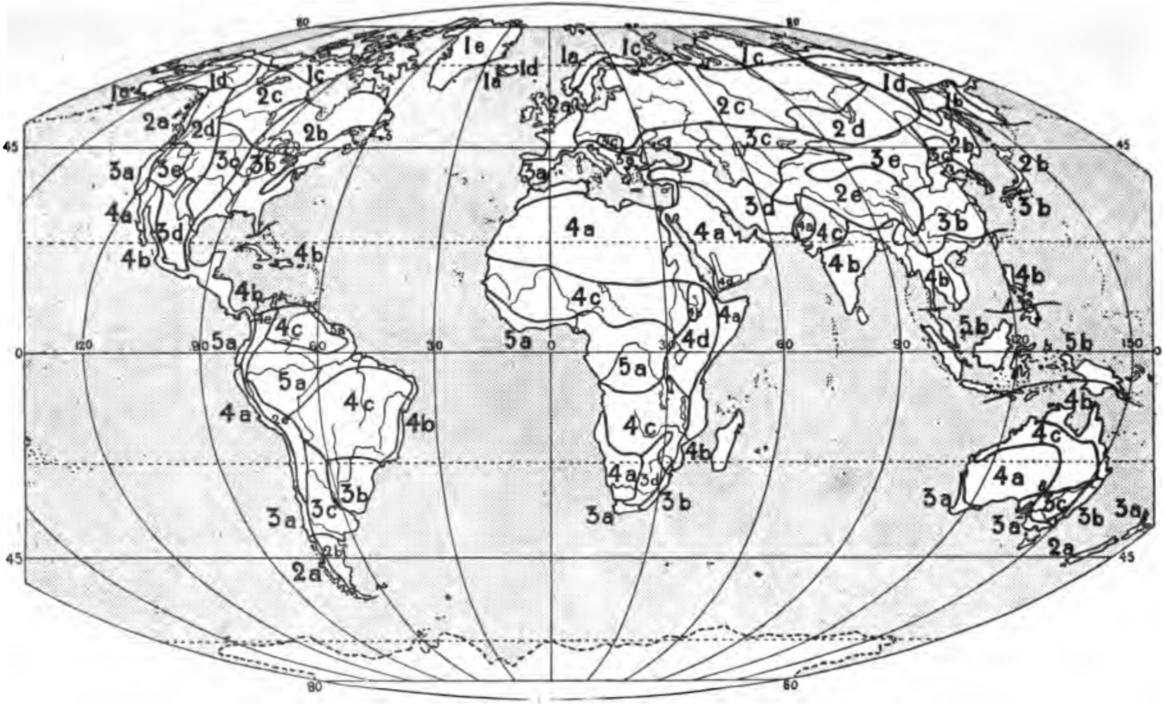

Fig. 1. Natural Regions of the World (as described in the text).

the transition is sometimes sufficiently rapid to arrest the attention to the passage from one to another. The traveller by rail from east to west across Canada is struck by the almost sudden entry upon the prairies, which belong to the 'interior lowlands' region (2*c*), from the 'eastern marginal' region (2*b*) of rocky undulating woodland. It must be clearly understood that the regions named in the above list do not represent each a single tract of country; they are not individuals but types. Their occurrence in different parts of the world are broadly tabulated below. The wide extent of land in high northern latitudes, in contrast with the very small extent (apart from the south polar land-mass) in corresponding southern latitudes, accounts for the absence of some of the types from the southern hemisphere.

1*a*. *In Europe*: **Norway**, excepting the south-west. South-western Iceland. *In. N. America*: Western Alaska.

1*b*. *In Asia*: **Kamchatka** and adjacent coasts.

1*c*. The **Tundra** tracts (p. 21) in Northern Europe, Asia, and America.

1*d*. *In Europe*: Northern and Eastern Iceland. *In Asia*: North-eastern Siberia. *In N. America*: **Yukon** basin.

1*e*. **Greenland**: Antarctic Lands.

2*a*. **Western** Marginal Lands. *In* **Europe**: British Isles, South-western Scandinavia, Denmark, Western Germany, Holland, Belgium, France (except Mediterranean slopes), Northern Spain. *In N. and S. America*: Pacific seaboard (Canada and North-western States, Southern Chile). *In Australasia*: Tasmania, New Zealand (excepting north).

2*b*. **Eastern** Marginal Lands. *In Asia*: Amuria, Eastern Korea, Northern Japan. *In N. America*: **St. Lawrence** basin (Eastern Canada and Labrador, south of the Tundra, east of the prairies), Newfoundland, United States (north-east and higher Appalachian slopes). *In S. America*: Southern Argentina.

2*c*. *In Eurasia*: Central Lowlands, European Russia (excepting south) and Western **Siberia**, with Alpine lands and parts of Germany, Austria, Sweden. *In N. America*: northern prairie lands.

2*d*. *In Asia*: **Baikalia** and adjacent plateau lands. *In N. America*: northern part of western mountain region, in Canada (British Columbia) and North-western States.

2*e*. *In Asia*: **Tibet** and adjacent mountain-lands. *In S. America*: Andean high plateaus and mountain-lands in Peru, Bolivia, Chile, &c.

3*a*. *In Europe, Asia*, and *N. Africa*: **Mediterranean** coast-lands, including Spain (greater part), Portugal, France (part), Italy, Austria-Hungary (Adriatic seaboard), Balkan countries, coast-lands of Asia Minor, Syria, and North Africa. *In N.* and *S. America*: Pacific seaboard (California, &c., Northern Chile). *In S. Africa*: south-western extremity (Cape of Good Hope). *In Australasia*: the south-west of Western Australia, the south of South Australia, Northern New Zealand.

3*b*. *In Asia*: **China**, Western Korea and Southern Japan. *In N. America*: United States, approximately Iowa, Missouri, Arkansas, Eastern Texas and east thereof to the Atlantic, including Gulf coast. *In S. America*: South-eastern Brazil, &c. *In Africa*: South-eastern coast-lands. *In Australasia*: seaboard of New South Wales.

3*c*. *In Eurasia*: **Turan**, Trans-Caspian and Caspian districts; Southern European Russia (Black Sea), Danubian plains (Rumania, Hungary, &c.), Manchuria (part). *In N. America*: West Central States below western mountain region. *In S. America*: Northern Argentina. *In Australasia*: interior parts of New South Wales, Victoria, South Australia (south).

3*d*. *In Asia*: **Iran** (interior of Asia Minor, Persia, Baluchistan, &c.). *In America*: interior (arid) lands in South-western States and Mexico. *In S. Africa*: interior (veld) lands.

3*e*. *In Asia*: **Mongolia** and adjacent lands (without parallel elsewhere).

4*a*. Deserts of *N. Africa* (Sahara, Somaliland), *Asia* (Arabia and Syria, North-west India), *N. America* (south-west), *S. America* (central Pacific coast-lands in Northern Chile, &c.), *S. Africa* (Kalahari, &c.), *Australasia* (West Central Australia).

4*b*. *In Asia*: **India** (excepting north-west), Burma, Siam, Indo-China, Southern China, Philippine Islands, &c. (Asiatic monsoon lands). *In America*: Central America, Caribbean seaboard (Colombia, Venezuela), West Indies, Brazilian seaboard (part). *In Africa*: Abyssinia (part), Central East African coast-lands, Madagascar. *In Australasia*: Queensland and Northern Territory coast-lands; Southern New Guinea.

4*c*. *In Asia*: North-west India (Punjab, &c.). *In S. America*: Orinoco basin (except coast-lands), and southern interior of Brazil. *In Africa*: **Sudan**, Upper Zambesi and Congo lands. *In Australia*: interior lands marginal to desert (north and east).

4*d*. *In Africa*: **East African plateau**. *In Asia*: highland of South-western Arabia (Yemen).

4*e*. *In S. America*: mountain-lands of Northern Andean system, **Quito** (Ecuador, Colombia), without parallel elsewhere.

5*a*. *In Africa*: Congo basin and Guinea Coast. *In S. America*: **Amazon** basin in Northern Brazil, &c., and Guiana coast-lands.

5*b*. *In Asia*: **Malay** Peninsula (south), and greater part of archipelago.

The countries, then, belonging to each of these type-regions or groups, possess certain features in common, features of climate (Fig. 2), relief, vegetation (Fig. 3), water-supply, and the rest. By these they are fitted (whether well or poorly) or unfitted for settlement and

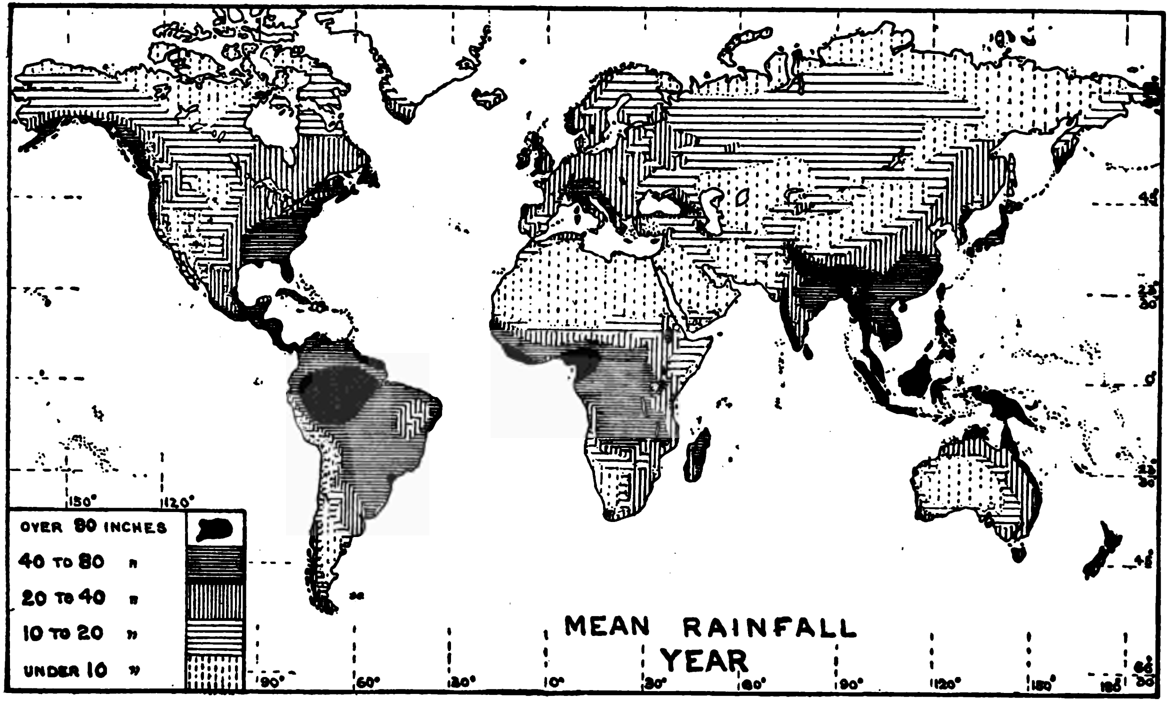

Fig. 2. Mean Annual Rainfall.

commercial development by man. Their temperature is broadly indicated by the names of the four main divisions. As regards rainfall, we have to bear in mind, firstly, the general decrease in the average annual precipitation from the equatorial regions northward and southward. Secondly, a markedly heavy rainfall is found on the slopes of mountain systems which face prevalent winds. Thirdly, a relatively light rainfall will be found over inland districts sheltered by mountains from prevalent winds.

The wet equatorial lowlands (5*a*, 5*b*), with their great heat and extreme moisture—such as we dwellers in temperate regions call a hothouse climate—are covered as a hothouse is filled with luxuriant vegetation. The true tropical forest with its dense undergrowth is often almost impossible to penetrate. In these forests the principal hard woods are found, such as mahogany, teak, and ebony. The palm and bamboos are typical of the characteristic broad-leaved tropical trees. Tropical or sub-tropical forest trees occur in the Congo basin and the coast-lands of the Gulf of Guinea, over vast areas in the Amazon and adjacent basins in South America, in Malaysia, New Guinea, and the north of Australia, and in those parts of India where the rainfall is heaviest. On the Himalayan slopes, as on other mountain ranges, the character of the forest varies from sub-tropical at the base to sub-arctic at the uppermost limit of trees. The same transition in such cases is found within a few thousand feet of elevation as would be spread over fifteen, twenty, or more degrees of latitude if independent of elevation. Thus, from the foot of the Himalayas to the upper limit of trees, from the south to the north of Japan, from the Mediterranean to the Baltic, from Florida to the Great Lakes, there is a similiar range of

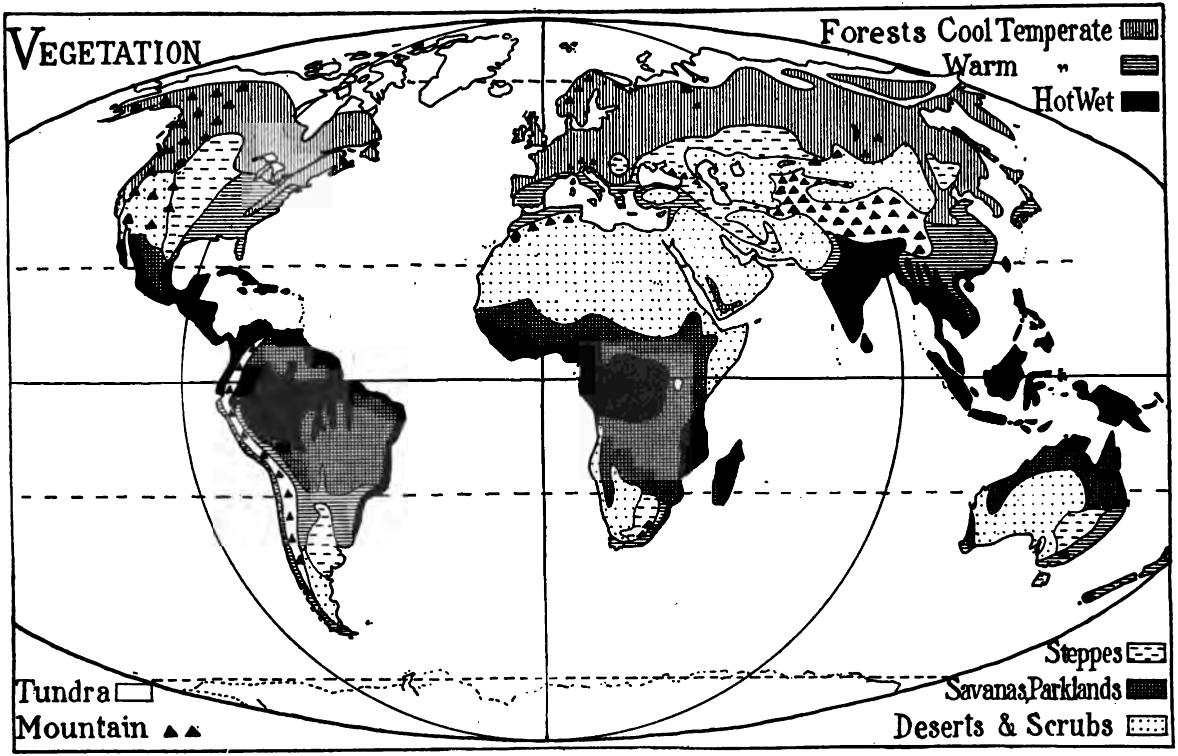

Fig. 3. Vegetation Regions.

trees—from the sub-tropical bamboo, cork-oak, or palm, through the deciduous woodlands of the middle temperate regions to the larches, spruces, firs, and pines of the upper or northern forests. The clearing of the forests in Western Europe, the outcome of centuries of highly civilized settlement, is the most marked example of the modification of natural conditions by man. The coniferous trees which predominate in the more northerly forests are fitted to grow in districts of comparatively scanty rainfall, as they lose little moisture by evaporation through their small thick leaves.

The forest thins out into 'park-lands' of mixed woodland and grassland, well watered, and capable of cultivation without irrigation. Thence we pass into dry grasslands, suitable for pasture, but requiring more or less irrigation to adapt them to cultivation. Grass is the natural covering of all open lands except absolute desert. The transition from sufficiency to insufficiency of natural moisture for the purposes of cultivation is seen, for example, in passing from the well-watered eastern parts of the Canadian prairies to the 'dry belt' in the west. These dry lands are naturally green only in the wet seasons; without rain they become parched and brown. They suffice for pasture in their natural state, and are capable of cultivation when irrigated. The hot deserts themselves may be reclaimed where irrigation is possible (chap. x). The tundra or cold desert of the arctic regions, to which the sub-arctic forests give place on their northern side, form a natural region (1*c*), as we have seen, and will be considered in chap. ii.

CHAPTER II

COLD REGIONS

(Regions under Group 1.)

So far as commercial geography is concerned, the south polar region scarcely comes under consideration, being uninhabited and but little exploited. The north, on the other hand, possesses many features of interest. We have seen that it is not often possible to draw a distinct boundary line between the natural regions, and it is difficult to do so, in some parts, between the arctic and the temperate. Thus while the tundra lies clearly demarcated from the forest belt to the south of it, which marks the northern limit of the cool temperate region, there is no such clear line to be drawn on the North Atlantic coast districts. Hence, on the Scandinavian side, we have the isotherm of 32° Fahrenheit in winter swept northward through nearly 30° of latitude in comparison with its position on the American coast, owing to the warm North Atlantic drift. Iceland and Norway, enjoying this oceanic type of climate, lie within the latitude of the tundra belt of North America, and only the southern extremity of Norway lies farther south than Greenland. But in spite of oceanic influence, the conditions of life in Iceland, and in Northern Norway at least, as well as in Labrador, are essentially arctic in character. The northern limit of cereals on the respective coasts provides an approximate line between arctic and temperate conditions; Labrador and Iceland lie outside (north) of it, but on the other hand only the northernmost part of the Norwegian coast lies north of it. But at the south of Labrador the transition from arctic conditions to those of the St. Lawrence region (2*b*) is decidedly abrupt.

The tundra (the word is Russian, meaning a marshy plain) consists of lowlands (1*c*), which are frozen for the greater part of the year. In summer they thaw on the surface, and low grasses and mosses struggle into life. In North America they are penetrated by a few Indians, and the coasts (not the inland parts) are inhabited by scattered tribes of Eskimo, a people which ranges from Greenland and Labrador to the Bering Sea, a few being found on the Asiatic side of that sea. In the Russian tundra are such people as the Samoyeds. In Norway we find the Lapps. All these are uncivilized or partially civilized peoples, nomadic of necessity if not by choice, as they have to move from place to place in search of the scanty means of livelihood. On the Norwegian coast and in Iceland, Greenland, and Labrador, on the other hand, there are settled, civilized, trading populations.

Types of Arctic Trading Communities. The town of Hammerfest, the most northerly in Norway and in Europe, may be taken as a typical arctic trading centre, its trade depending almost wholly upon the sea, as the hinterland is mountainous, snow-covered, and inhospitable. Its mean annual temperature is 35.4° Fahrenheit (January, 22.6°; July, 53.2°). Its commercial activity is confined for the most part to the summer months and especially between the middle of May and the end of July, during which period the Sun does not set there. Its fishing vessels range as far as the Kara Sea and Spitsbergen, and an active trade is carried on in salt fish, cod-liver oil, eider-down, and reindeer and fox-skins. Salt is largely imported for curing. In the winter there is little chance of activity, and from the middle of November to January the Sun does not rise.

Iceland is the most northerly country in which the breeding of sheep and cattle is the principal occupation, engaging as it does more than half the population. It owes this industry to a relatively mild climate for its latitude, and to the considerable extent of grasslands along the fjords, where the land is of the 'Norway' type (1*a*), and where the inhabitants are concentrated, while the plateau above (1*d*) is bare and the temperature greater in range and more severe. A dependent industry of the sheep-breeding is that of spinning and weaving the wool. Live sheep and salt meat are exported, together with wool (raw and manufactured) and hides. But the typically arctic articles of export are eider-down and the products of the fisheries—cod and oil, herring, halibut, salmon, &c.

In Greenland, the typical 'ice-capped' land (1*e*), there is a habitable coastal margin, of greater and more northerly extension on the west than on the east. The conditions of trade are peculiar. The trade is a monopoly of the Danish Government. This monopoly is designed to protect the Eskimo from the drunkenness and other vices which frequently overtake primitive peoples when they come into unrestrained contact with civilized traders. About sixty trading settlements, each under a government official, are established along the coast. To these the Eskimo from their hunting and fishing stations bring the products of the chase, principally blubber, which is boiled for oil, seal-skins, bear-skins and fox-skins, eider-down and fish. The seal-hunting is principally a winter occupation. In return the natives are able to buy simple necessities of European production, at or below the cost of purchase in Europe and freight to Greenland. The Government also obtains royalties from the mining at Ivigtut for cryolite, a

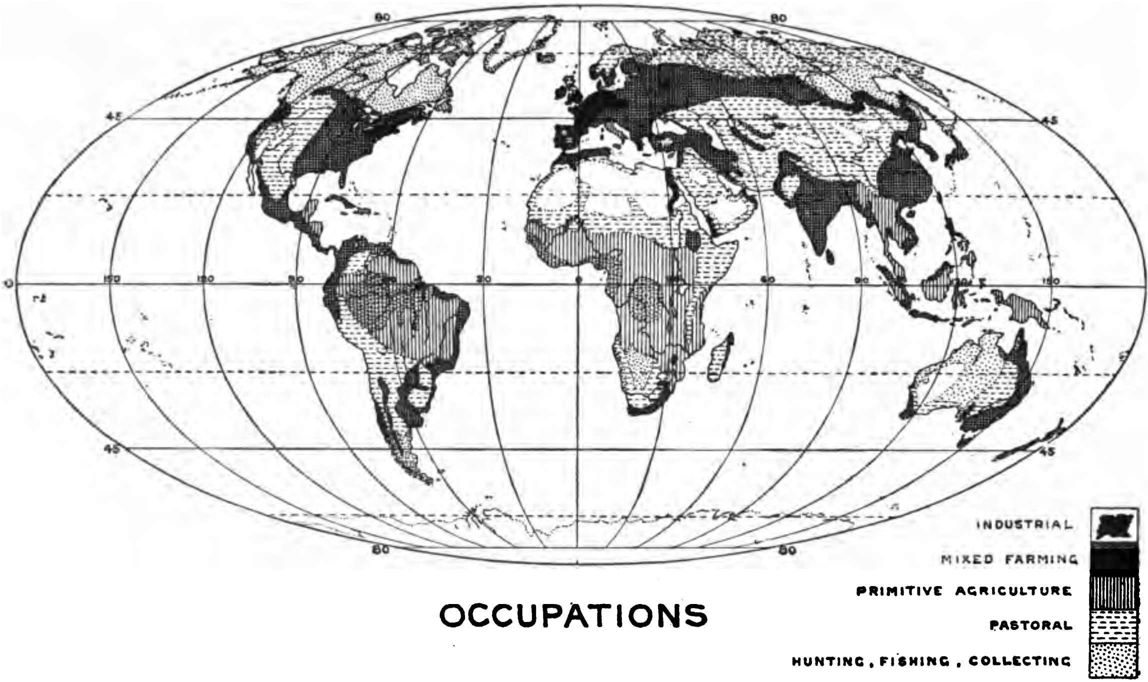

Fig. 4. Distribution of Occupations.

mineral hardly known elsewhere, and valuable in connexion with the production of aluminium. Graphite and an inferior quality of coal (near Disko and Umanak) have been worked. A fund is maintained out of the proceeds of trading and is devoted to charitable and other works of benefit to the community. But the Government, which formerly made large profits from its monopoly, can no longer do so. The development of the seal fisheries elsewhere has diminished the value of seal-oil. Shipping is practically confined to the months from June to October.

The white population of the coast of Labrador devotes itself almost wholly to the fisheries, which are principally for cod. Of the native inhabitants the Indians hunt inland in the south, over which the sub-arctic forest extends. The Eskimo, as elsewhere, hold to the coast, fishing and hunting the seal.

Fisheries. The cod and other fisheries above mentioned belong to an industry of which the principal centres are in the seas of the temperate regions, so that their consideration may be deferred. The seal 'fisheries', however, are almost essentially an industry of the polar regions. The true seal does not supply the 'seal-skin' with its beautiful fur, but is taken for its hide and blubber, its coarse hair being of little worth. The sea-bears, which also belong to the seal family, are the fur-seals. These are found mainly in Bering Sea and the North Pacific Ocean—on the Pribilov and Commander Islands, and other neighbouring shores. In the southern oceans they are or have been taken about Cape Horn, on the Falkland and Crozet Islands, in South Africa, Kerguelen, Southern Australia and New Zealand. They are also found on the Lobos Islands at the mouth of La Plata river. The southern seals are less numerous and valuable than those of the north. The northern fur-seals herd in 'rookeries' from May to July on rocky beaches, the young are born, and all migrate southward about November. The seals can be driven from the beaches inland to adjacent killing grounds, and this method allows of care being taken to avoid killing breeding females. But the method of pelagic sealing—i. e. hunting at sea with gun or harpoon, in which it is not possible to take the same care—led to a great reduction in the number of seals, and in modern times the numbers and catches of fur-seals greatly decreased. The hunting, and the numbers taken, had therefore to be regulated by a joint commission of the British, Canadian, and American Governments. The sea-otter is another animal yielding splendid fur which is found on North Pacific shores, and especially in the Aleutian Islands. It is more scarce than the fur-seal, and, like it, has been reduced in numbers by hunting, and a single skin has been known to fetch £400.

The true seal, as has been seen, is hunted more or less on all arctic coasts. The blubber, or coating of fat beneath the skin, is boiled down for train oil, which is also obtained from certain whales. The 'fisheries' for various kinds of whale are carried on in many seas, but the industry is most closely associated with the arctic regions. The Greenland or arctic right whale yields blubber for train oil, and also whalebone, a flexible substance once used for various purposes (such as umbrella ribs) for which steel is now used. It is also employed split finely for brushes requiring a very stiff bristle. The Greenland whale belongs essentially to arctic seas; it is not found in temperate waters, and its appearance off the coast of Labrador, far south of its limit in the East Greenland Sea, is clearly influenced by the Labrador cold current from the north. A whale probably belonging to the same species is the bowhead of Bering and Okhotsk Seas and neighbouring waters. The whaling industry centres chiefly upon Dundee and Peterhead in Scotland, New Bedford in Massachusetts, and San Francisco, from which ports whaling ships sail every summer. The Norwegian fishermen have developed a fishery for the bottle-nosed whale in the waters round Iceland and Jan Mayen Island; from this whale an oil akin to sperm oil is obtained. The rorquals or fin-whales and humpbacked whales are hunted in the seas of Norway and Iceland, the fishery also extending southward to the Faeroes, Shetland, and Hebrides, as well as to Newfoundland. The whale fisheries have in several directions suffered owing to reduction in the number of whales. At the height of the right whale fishery, about 1640, a summer fishing town called Smeerenburg used regularly to be established in Spitsbergen. The black whales of the southern seas, especially off South Africa, Kerguelen Island, Australia, and New Zealand, have been almost exterminated. Various smaller kinds of whale are hunted for blubber and hides; these fisheries are not confined to northern seas. The narwhal's horn supplies an inferior ivory; so do the tusks of the walrus, which, like its relative the seal, also furnishes a useful hide and oil.

Minerals. Mining is carried on under arctic or semi-arctic conditions in several localities. Of these the most important is North-western America, including Alaska (belonging to the United States) and the Yukon Territory of Canada. Gold had been known to exist, and was worked to some extent for nearly forty years before, in 1896, there occurred the great 'rush' to the Klondike district. The gold is found in the valleys of a number of creeks or small tributaries of the Upper Yukon River, and is alluvial; when the gravels are worked out there is apparently no quartz to which the miners can turn their attention. These fields, and Dawson City, their centre, have therefore been deserted by many miners in favour of Alaskan fields lower down the Yukon, where gold is found about Circle City, as well as in the tributary valleys of the Tanana, Koyukuk, &c. On Norton Sound, to the north of the Yukon mouth, is Nome, a place distinguished, it is said, as having been named from the misreading of a cartographer's note, who wrote "? name" against a neighbouring cape on his map. Here placer-mining has been actively carried on since 1900, one deposit being known specifically as the tundra-placer. The principal quartz mines are situated near Juneau in the south-east of Alaska. Owing to the arctic conditions extreme difficulties of transport have had to be attacked. There is, for example, no fair harbour nearer than eighty miles to Nome. The White Pass, leading from Skagway, the port of the Klondike district, now surmounted by a railway, formerly saw many lives lost. Difficulties of transport were the cause of enormous prices for imported necessities of life. Fair roads have taken the place of many old trails. Steamers navigate the Yukon (St. Michael being the port near the mouth), and in this connexion the deposits of coal between Dawson and Circle City are important. Coal is also found in the Alaska Peninsula and elsewhere; copper, silver, and tin have been discovered; and marble (Prince of Wales Island) and gypsum (Chicago Island) add to the natural wealth of Alaska.

Iron ore is known in the districts of Hudson Bay and Ungava Bay, and gold and copper, nickel and lead have also been found in Labrador, but workings have not been developed. Reference has already been made to the cryolite of Greenland (p. 22).

The second great mining district is that of Northern Sweden, where some of the richest deposits of iron ore are found, in the Malmberg ('iron mountain') near Gellivara, some 40 miles N. of the Arctic Circle, and farther north at Kirunavara and Luossavara. These are opened up by the most northerly railway in the world, which runs from Sweden to Narvik on Ofoten Fjord of the Norwegian coast. About the same latitude as Gellivara, but across the Norwegian frontier, are the copper mines of Sulitelma. The climatic conditions under which these Scandinavian mines are worked are less severe than those of Alaska. But an attempt has been made to work coal even in Spitsbergen, where it is necessary to cut through fossil ice as well as rock. Finally, a peculiar form of mining is seen in the search carried on in Northern Siberia, in the Lena and other valleys, for the so-called mammoth ivory. This consists of the tusks of prehistoric land animals, which must have inhabited these parts in great numbers. Their remains are in considerable part perfectly preserved beneath the frozen soil. The working and supply are somewhat erratic. It is a matter for investigation whether mineral development may be found possible in antarctic lands.

Furs. The fur-seal and the sea-otter have already been mentioned (pp. 24, 25). The bulk of most valuable furs are obtained from animals living in regions of severe winter (compare p. 80). The collection of furs is by no means a strictly arctic industry. No fur-bearing animal except the white or polar bear is confined to the region which we have defined as polar. On the other hand, a very large percentage of the most valuable furs come from the arctic or subarctic districts of North America,

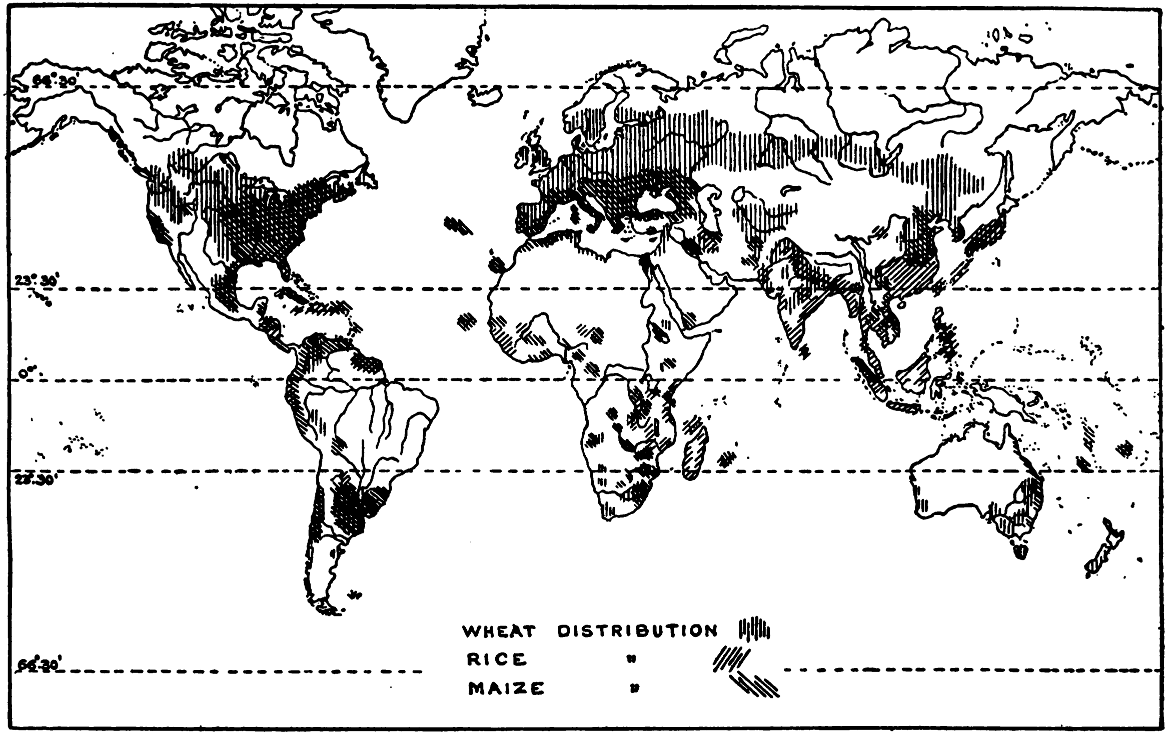

Fig. 5. Distribution of Important Food-grains—Wheat, Maize, and Rice.

Europe, and Russia, so that the industry may be regarded as belonging in great part to the transitional region between polar and cool temperate. The best districts for the most precious furs (apart from sea-otter and seal) are found in Siberia, Canada, and Alaska. Thus the most valuable sables come from the eastern parts of Canada and from Yakutsk in Siberia; Siberia produces the best ermine; Labrador is most prolific in the silver fox, by far the most costly of fox-skins. The white fox is found mostly in the Hudson Bay districts and Labrador, in Greenland and Siberia. There are taken also, wholly or principally in these regions, a number of less valuable furs, such as blue fox, lynx, musk rat or musquash, wolverine, arctic hare, and some bears. There are a number of companies possessing stations and agents scattered over the northern fur-producing districts. At these stations the hunters, who kill, by trapping, the fur-bearing animals, deliver their captures. Among these companies the name of the Hudson's Bay Company is the most famous.

CHAPTER III

TEMPERATE LANDS

(Regions under Groups 2 and 3.)

Physical Conditions. Cereals. Fruits. Animal Products.

THE temperate lands have a greater extent by far in the northern hemisphere than in the southern. They include all Europe, all Asia except the Arabian-Syrian Peninsula, the Indies and the Tibetan hinterland of India, and practically all North America. Of South America they include roughly the southern third, of

Africa only the southern extremity (besides the Mediterranean strip in the north-west), of Australia only a south-western corner and the south-eastern parts, and New Zealand falls within them. In the temperate lands bordering the oceans the extremes of summer heat and winter cold are only in exceptional seasons such as to limit the activity of man appreciably. The winters range from mild in the warm regions to cold about and north of the middle latitudes of the cool belt in Eastern America and Eastern Asia. Thus the great highway from the ocean to the interior of Canada, the river St. Lawrence, is frozen in winter, and the transatlantic steamers, instead of proceeding up the river to Quebec and Montreal, have to terminate their voyages at coast ports farther south. On the other hand, the warm Atlantic drift saves the western European seaboard from similarly severe winters. Extremes of temperature increase with distance from the sea; the most striking illustrations of this tendency are naturally found in the inner parts of Asia.

Western Marginal Lands (2*a*). The western margins in the cool lands have an equable climate and generally a moderate rainfall at all seasons. Where they consist of narrow belts, mountain slopes facing the ocean, and prevalent westerly winds across it, the rainfall is heavy. Such conditions appear in Scandinavia, British Columbia, and Southern Chile. To a limited degree the same effect is seen elsewhere, as in Scotland, Ireland, and the south of New Zealand. In these lands the characteristic deeply indented coasts provide natural shelter for shipping, of first-rate importance where the other conditions of the margin are such as to support any considerable population and sea-traffic is well developed. In Europe, apart from Scandinavia, the cool western marginal lands are not generally mountainous, so that the oceanic type of climate, free of extremes of heat or cold, extends its influence over a much wider area. The mediterranean-type region (3*a*) is the southward continuation, in the warm temperate zone, of the western marginal type in the cool. This again has its widest extent in Europe, where it includes all the lands bordering the Mediterranean Sea and south of the European mountain-barriers (Pyrenees, Alps, &c.). In North and South America it is represented only by the Pacific slope of the western mountain-system, in California and in Central Chile. In South Africa and in Australia only relatively small areas have similar physical conditions. Warm but not excessively hot summers, and mild winters during which practically the whole annual rainfall occurs, are characteristic of the mediterranean regions. The wide extent of the western marginal and mediterranean lands in Europe is of prime importance in commercial geography, for these lands have become the home of the greatest industrial and commercial communities, from which by colonization similar communities have been established in other parts of the world. It is even worth thinking for a moment how different the history of commerce and of civilization generally would have been if Europe had presented such a continuous mountain front to the Atlantic as America does to the Pacific.

Eastern Marginal and Interior Lands. On the cool eastern margins (2*b*), compared with the western, a somewhat greater range of temperature is found, especially in the direction of winter cold, and on the whole a less heavy rainfall. On the warm eastern margins (3*b*), as in China, summer rains prevail; the climate is of weak monsoonal type, though in Southern and Western Japan rain falls at all seasons. Summers are hot, winters very cold. In the corresponding region of North America, however, temperatures are generally less extreme, and in the southern hemisphere the lands of this type have mild winters. In the interior regions, as has been seen, the extremes of temperature become much more strongly marked; winters are long and hard, summers are very hot, and there is also much less rain, which falls chiefly in summer. The ultimate effect of this is seen especially in certain parts of Asia—the interior lowlands of type 3*c*—which although classed as warm, not hot lands, show practically desert conditions. Apart from these the central lowlands (lands of the *c* types) have become of the utmost economic importance, because they provide vast areas in which grain may be easily cultivated or stock raised for the food-supply of regions where great industrial communities are established. In the interior parts of Canada and the United States, in Russia, in Argentina, Australia, and New Zealand we shall find these food lands, sparsely inhabited by farming populations and supplying a huge surplus of grain and meat to feed more thickly populated regions.

Wheat is essentially a product of the temperate regions. The only great wheat-producing country outside these regions is India (especially the north-west), and here the grain is grown under exceptional conditions as a winter crop. Within the temperate regions it is very widely spread. Its varieties are many; particular varieties have been evolved with reference to their suitability for cultivation under particular conditions of climate and soil. This has assisted the extension of wheat-lands. In certain countries the people may be able to supply themselves at home with a sufficiency of one grain or another—the rice-lands are the typical instance, as will be seen. But as soon as people begin to import a food-grain, wheat is chosen. In spite of the concentration in Europe of dense population, requiring large wheat-supplies from elsewhere, Europe produces more wheat than the rest of the world. The proportions, however, tend to level up. In the earlier years of this century, the proportions to the total wheat produce of the world were for Europe about 60 per cent., for other countries about 40 per cent. The proportions have now become about 53 and 47 per cent. respectively. But if European Russia be left out of account the remaining European proportion falls to about 30 per cent.

It is our task to consider, not so much the great wheat-producing countries as such, as the great exporting countries. Among the densely inhabited countries of the western marginal and mediterranean regions in Europe, the United Kingdom depends to the greatest extent on external wheat-supplies. These supplies of wheat and flour are received principally from the United States, Argentina, Canada, Russia, India, and Australia, in the order given (according to an average over a recent term of years). We shall therefore consider these sources of supply regionally, omitting India at present, for the reason already given. In the northern hemisphere (in North America, Russia, the Danubian lands) the principal wheat-lands lie in and about the zones of transition from the cool to the warm central lowlands (2*c* to 3*c*), with the balance probably towards the warm; and in the southern hemisphere (in Argentina, Australasia), the chief wheat-lands are mostly within the warm regions.

Eurasian Wheatfields. In Russia wheat is grown northward to about 62° N. in the west; the northern limit decreases in latitude eastward, that is towards the

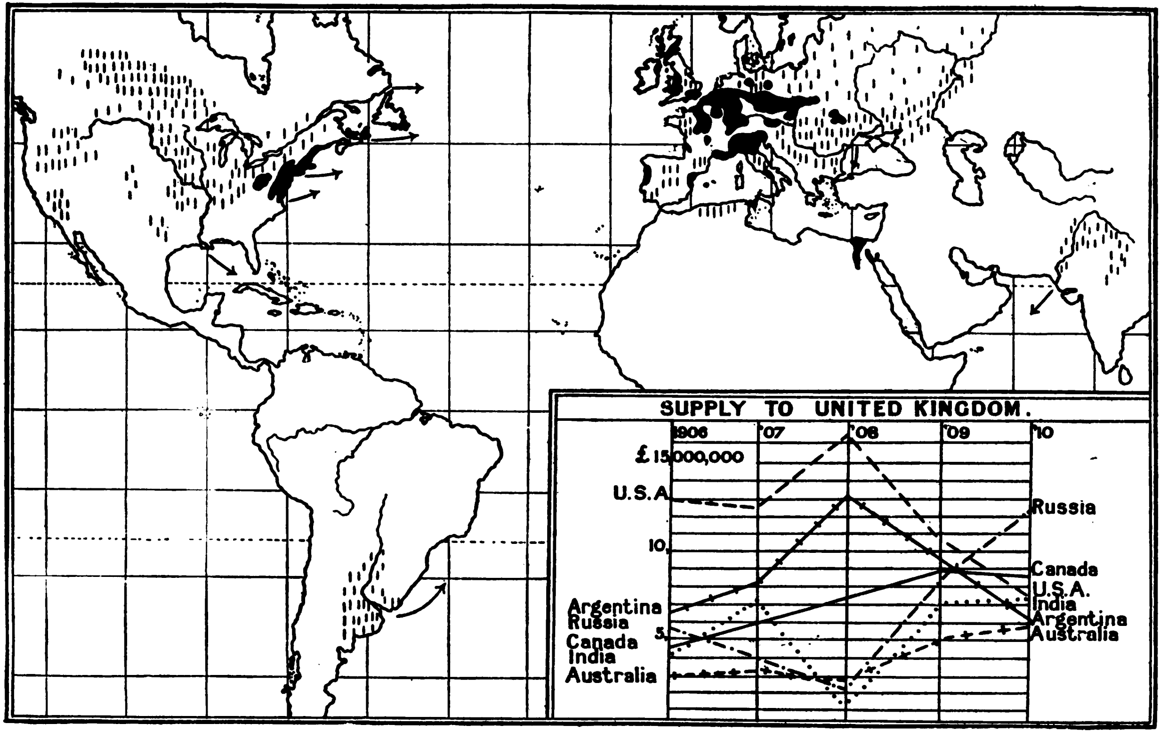

Fig. 6. Chief Sources of Wheat-supply (shown by short vertical lines) to the densely populated areas in Europe and North America (shown in black).

interior of the continent, where climatic conditions become more extreme and severe in winter. What may be called, however, the Russo-Danubian wheat region, where production is highest, lies north and west of the Black Sea. It extends up the Danube into Hungary, and in Russia occupies the basins of the Pruth, Dniester, Lower Dnieper, Lower Don and Middle Volga, and is identified roughly with the 'black-earth' districts. These lie south of a line joining Kiev, Tula, Kazan, and Ufa, and it is in the western Governments lying south of this line—Podolia, Kiev, Poltava, and Kharkov—that agriculture, and in particular wheat culture, are in the most satisfactory condition. The reasons for this are largely connected with climate. While the summer temperature varies little over the whole of the black-earth districts (which are roughly bounded on the north by the July isotherm of 70° Fahrenheit), the average winter temperature decreases rather rapidly from west to east. In the west the January mean will be little, if anything, below the freezing-point; in the east it may be from 10° to 20° below it, and the winters are much longer. The mean annual rainfall also decreases from west to east—from 20 inches (or upwards in the Danubian field) to about 12 inches. The eastern districts are indeed liable to drought, and have not infrequently suffered from famine. Viewed regionally, these districts show the beginning of the transition from the sufficiently to the insufficiently moist, and, in temperature, from the equable to the extreme types of interior lowland. Siberia has wheatfields principally in the districts about Tobolsk and Ishim, and Tomsk. But here are vast marshy areas unsuited for agriculture, and apart from these and severe climatic conditions, settlement and cultivation are dependent on the single line of the Trans-Siberian railway, since the rivers provide an outlet only to the arctic seas. South Russia and Romania, on the other hand, are served by Odessa and other adjacent Black Sea ports.

American Wheatfields. Wheat culture in America offers various contrasts to that in Russia. Its centre is in the interior lowlands (2*c*, 3*c*), though it has extended into them from the eastern marginal regions (2*b*, 3*b*); while there are practically detached fields on the western margin (2*a*, 3*a*), principally in the States of Washington, Oregon, and California. The area of heaviest production, however, is found in the central lowland region, where temperature conditions are transitional from cool to warm, as in Russia. This area includes the States of Kansas, Nebraska, the Dakotas and Minnesota, and the Canadian provinces of Saskatchewan and Manitoba.

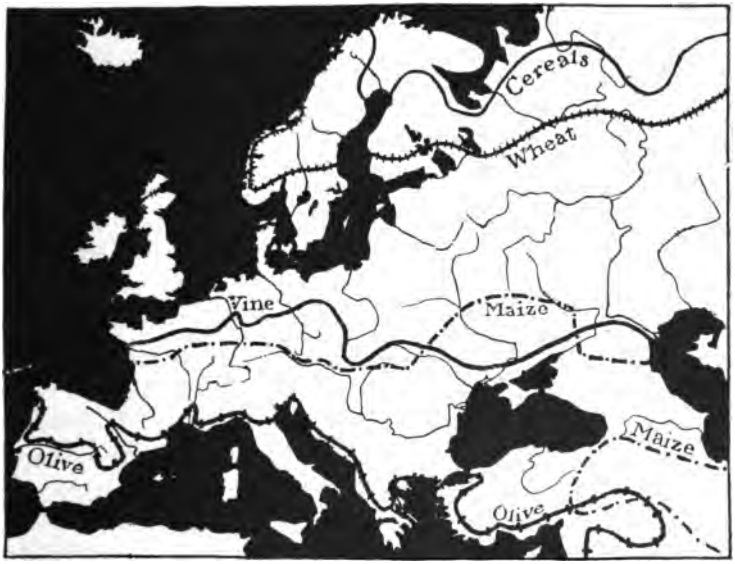

Fig. 7. Northern Limits of some important Cultivated Plants in Europe.

This area or centre of heaviest production does not remain stationary, and herein lies one of the most important geographical features of wheat production. With the extension of settlement in America, at first westward in the United States, later north-westward in Canada, the wheat centre has shifted westward and northward. Wheat, so far as concerns the bulk of its production, has been 'a pioneer crop, to be grown on free or cheap land'. It has been and is grown in America most profitably for commercial purposes on new lands, not densely populated, and divided into large farms (chap. x). A high rental and great expense in manuring old land which has been steadily cropped for very many years are thus avoided. The average yield per acre is not so heavy from the new lands as from the old, but the great extent of new lands available for cultivation more than balances this. There is, then, a triple contrast between the conditions of wheat production in the new lands of America, the old lands of Russia, and the old lands of the western European margin :—

(*a*) *New Lands of North America.* Extensive cultivation for export, ground not artificially enriched, average production about 14 to 20 bushels per acre.

(*b*) *Old Lands in Russia.* Here rather backward methods of farming are applied; continual cropping, even of the very fertile black soil, makes for low yield—about 9 to 10 bushels per acre. The available land is of great extent, and the production permits of export, but, as already seen, there is liability in some parts to failure of the crops.

(*c*) *Old Lands of Western Margin of Europe.* Intensive cultivation, home consumption (not export), ground artificially enriched, average production about 20 to 32 bushels per acre. Typical fields are found in

France (especially the Middle Seine districts and north thereof to Calais, and the Lower Loire district; the country being self-supporting in wheat production), in Central Germany, about and west of the Middle Elbe; and in England, especially East Anglia.

In America, as the close settlement of the land extends westward, the large wheat farms (bonanza farms) tend to become divided into smaller farms on which wheat finds a place only among other crops as profitable as wheat or more so. At the beginning of the nineteenth century the centre of greatest production was on the Atlantic seaboard from New York to Virginia. In the middle of the century Pennsylvania was the chief wheat-producing State; Illinois then took its place, and finally Minnesota. In the meantime the north-westward extension in Canada, from Ontario into Manitoba, and thence into Saskatchewan and to a lesser degree Alberta, has taken place. The necessity of extending the American wheat-fields is leading to the extension of irrigation in the interior highland regions (2*d*, 3*d*) and the dry western parts of the interior lowlands. Much has been done, and much remains to do, in this direction in Alberta (especially under the irrigation scheme of the Canadian Pacific Railway Company), and in Colorado, Utah, and Arizona. In the State last named practically all wheat land is irrigated. Southern Alberta, with an annual rainfall of 12 to 14 inches, may be cited as a parallel to the eastern part of the black-earth district in Russia. The development of American wheat culture is associated in a remarkable way with that of transport facilities, and in that connexion we shall consider it later (chap. x).

In Argentina the wheatfields represent new-land cultivation at an earlier stage of geographical extension than that of the North American fields. The wheat-lands are principally confined to the eastern districts, in the provinces of Buenos Aires, Entre Rios, Cordoba, and Santa Fé. These represent almost exactly the area covered by a network of railways. Wheat cultivation is extending also in Uruguay. The climatic conditions approximate to those of the more southerly wheat-lands in the United States, being warm, but they are more moist; the eastern coastal rainfall is about 34 inches annually.

In Australia the extension of wheat culture has followed the same lines. It was at first confined to coast lands, but has been pushed inland throughout the warm marginal regions where the rainfall ranges from 40 to 20 inches yearly. The three principal producing States are thus Victoria, New South Wales, and South Australia. In South Australia the fields extend inland (northward) from Adelaide and Spencer Gulf. Wheat culture has already reached the dry inland region where irrigation becomes necessary if the crops are to be saved from liability to failure.

Conditions of Cultivation. From what has been said the very wide geographical range of wheat will be realized, though some other cereals are capable of wider distribution. Within these very wide limits it can be profitably grown wherever certain broad conditions of climate and rainfall exist, with practically any kind of fertile soil. The requirements for the production of a good quality are a cool moist season for sowing and early growth, and a dry warm season for harvest. These requirements correspond, essentially, to the description of temperate climate. Omitting, then, the tundra region of Europe and North America and the small hot desert area in the latter, it appears that wheat is or may be grown over great parts of both these continents. It has a wide west-to-east range in Northern Asia and extends into Japan; it is also grown in Persia, and in all lands, European, Asiatic, Mediterranean, and African, of the mediterranean type (3*a*). Egypt, irrigated by the Nile, produces it, and, in the period of history when the Mediterranean was the centre of civilization, Egypt was one of the principal sources of supply. In what is now Tripoli, during the period of the eminence of Carthage and after (p. 107), irrigation rendered wide lands fit for wheat culture; similar conditions obtained at an earlier period in Mesopotamia, which indeed is considered by some authorities to have been the original natural home of the wheat plant. Besides the South American and Australian fields which have been mentioned, wheat is successfully grown in Tasmania and New Zealand and on the elevated plateaus of South Africa.

Intensive cultivation, with its higher yield, tends to be gradually extended over lands which are now not artificially replenished. The closer settlement of a country like the United States with a rapidly growing population tends to result in a decreasing surplus of wheat for export. The ultimate outcome of such processes would be a tendency for the European importing countries, even England, to depend more and more on their own intensively cultivated lands, devoting these more and more to wheat. But the limit of new lands available, whether naturally or under irrigation, is still far from being reached.

Barley has a capacity for cultivation wider in a geographical sense than that of any other cereal. The northern limit of cereals, to which reference was made in drawing a division between the arctic and cool temperate regions in Norway, is in point of fact the northern limit of barley. It is cultivated near Tromsö in that country—about 70° N. The fields within the temperate regions are closely similar to the wheatfields, but barley extends more widely than wheat into the hot lands. It is also more freely grown in such districts as the Siberian cereal belt and in Central Asia and Asia Minor. To be of good quality it does not require too rich a soil; it may therefore follow a wheat crop in some soils, but naturally it prefers a light open soil. The European areas of heaviest production are the eastern and northern coast lands of the Black Sea (Russia), Rumania, a belt extending from Hungary into Central Germany, and the great grain-growing districts of Northern France; it is also freely grown in the United Kingdom and in Denmark. In North America it is grown most heavily in California and in Manitoba and south thereof, from the Great Lakes westward to the Mississippi. It is used chiefly in brewing and distilling, and in cookery (as in the form of 'pearl' barley). As a bread-grain its use would seem to have greatly declined since early times; it has been asserted to have been the first food-grain used by man.

Oats also have a distribution not unlike that of wheat, but they are capable of most successful cultivation in a cooler climate. In Europe they are therefore essentially a northern grain. Thus in Russia they are most heavily cultivated north of the black-earth districts. Similarly in North America the area of heaviest cultivation extends along the St. Lawrence, south of the Great Lakes, northward into Manitoba, and not much south of St. Louis. Oatmeal is baked into cakes (not bread) and widely used to make porridge or gruel. Oats are also a valuable fodder, especially for horses; and it has been stated that a recent decline in the extent of the cultiva tion of oats in England has been directly connected with the increasing use of motor instead of horse-drawn vehicles.

Rye again may be ranked as a northern grain. Its heaviest cultivation is in Europe, especially the north German plain, extending thence into Central Russia. It well endures extremes of climate, inferior soil, and simple methods of cultivation. Hence this distribution, and the wide use of rye (black) bread among the peasant peoples of Northern Europe. Rye is also grown as a fodder.

Buckwheat is the fruit of a herbaceous plant, enclosing a three-sided seed. It is grown and used somewhat similarly to rye, the meal making cakes or groats, and the plant being also a useful fodder. In Russia bees produce great quantities of honey from the flower. Within the cool regions, besides Russia, other northern countries grow the plant, and it is also in favour in the United States.

Maize, Indian corn, or in America simply 'corn', differs from the grains hitherto discussed as being essentially a grain of the warm regions, whence its cultivation extends pretty widely into the hot lands, but very little into the cool. It bears neither frost nor a very dry summer. The moderate summer rainfall of the Mississippi basin suits it admirably; so does the warm rich soil there. In Europe its cultivation is practised chiefly in the basins of the Danube and the Po and adjacent lands, and, speaking more generally, in all the lower-lying agricultural lands south of about 48° N. In the United States it is the cereal most widely grown; it occupies an acreage between twice and three times as great as that under wheat. Maize is freely grown on lands of the warm eastern marginal type in Brazil and

Argentina, New South Wales and Queensland, and China, and being also cultivated in hot lands (chap. v) is one of the most important food-grains. The meal is used for bread if mixed with rye meal (especially in Portugal and Spain), or alone for a form of cake or to make such dishes as hominy; in America and elsewhere the heads of the plant are boiled whole as corn-cobs and the grain eaten off them. Corn-flour is made from the grain, which is also used in brewing and distilling. As a forage plant maize is very valuable. The grain is particularly rich in oil, and sugar has been made from the stalks.

Some of the cereals grouped under the name of **Millet** are cultivated in Central Europe and the more southerly lowlands of the United States, mainly those west of the Mississippi. Where they are not grown but imported perhaps their most familiar appearance is as bird-seed. Some millets, however, are exceedingly important food-grains in hot lands (chap. v).

Spices, condiments, and like products come in greater part from hot lands, though mustard and caraway are examples of exceptions.

Fruits. *Apples, &c.* The distribution of the chief fruits of commerce within the temperate lands is very closely regional. Broadly speaking, the chief fruit-growing districts are found in the marginal regions, whether cool or warm—the western marginal and mediterranean lands (2*a*, 3*a*) of Europe, the eastern margin and Pacific slope in North America (2*b*, 3*b*, 2*a*, 3*a*), and so on. The apple is the tree-fruit capable of cultivation in the highest latitudes or at the greatest elevation. In Norway and Russia it is grown at 65° to 62° N. The lands most suited for its cultivation are in the cool marginal regions—where sufficient moisture is obtained, but also, especially, where summers are warm—for example throughout Central Europe, and in North America in the lands surrounding Lakes Erie and Ontario (particularly in the Ontario peninsula), and south of them through Ohio, Pennsylvania, and Delaware, and on the western margin from British Columbia to California. Apples are grown too in the corresponding regions of Australia and South Africa and in New Zealand, and to some extent in China and Japan. Pears and the stone fruits of temperate climates show a similar distribution. Fruits of the more perishable sort, such as strawberries and other berries, will not bear transport over great distances, but sometimes form an important article of short-distance commerce, as from France to England.

Vine. The vine belongs to the warm marginal regions, or to the warmer parts of the corresponding cool regions. A low winter temperature does not prevent its cultivation, so it extends into the heart of Europe; but it requires a long warm summer for ripening, and is not profitably cultivated north of about 51° N. in Central, and 47° N. in Western Europe. It is mainly a mediterranean (3*a*) cultivation (California, Victoria, and South Australia, Cape of Good Hope), though not exclusively, as it flourishes in some parts of the Eastern United States. In Europe, France (in which the most important centre is the Bordeaux district), Spain, Portugal, Germany, Italy, and Austria-Hungary are the principal wine-producing countries. A warm and well-drained soil, but not of the richest character, is best, and the character of soil is the most important factor in wine-production, for the same vine under similar climatic conditions will yield wines of different character if grown in different soils. On the whole, the finest qualities of wines are produced in the more northerly districts of production.

A map illustrating the chief European districts of viticulture shows them to be confined mostly to great river valleys, such as the Gironde, Rhone, Rhine, Douro, Tagus, &c., and to the Mediterranean coastal districts. Grapes dried as raisins or currants are an important article of commerce; the currant grape is almost exclusively a product of Greece, and its name is corrupted from that of the town of Corinth there.

The Fig is another typical mediterranean fruit. Locally in the European Mediterranean region it is a food-product of great importance, and as it is good to eat when dried it is easy to export. The parts of Asia Minor about Smyrna are specially noted for it.

The Orange is in regional distribution transitional from warm to hot lands. Originally it is a product of the monsoon region of South-eastern Asia. Requiring for its cultivation a sufficiency of both moisture and heat it has become an important product of most of the regions of mediterranean type, especially the European.

Hops, used in beer-making, are grown most largely in the western marginal regions of Europe and North America, but only locally in these, as they demand a very rich soil. Kent and a few other southern counties of England, Bavaria and Bohemia, Washington, Oregon, California, and New York are the main producing districts.

Potatoes and *Vegetables* do not enter into long-distance commerce to a very great extent, being either too bulky or too perishable to be profitably exported. Large cities have extensive market gardens in their immediate neighbourhood. But an example of short-distance traffic in vegetables is found in that to the London market from France, the Channel Islands, Scilly Isles, &c., where the climatic conditions favour especially the production of vegetables earlier in the season than they can be gathered locally. The same applies to the trade in cut flowers.

The Sugar-beet is a product of the temperate regions. The sugar-cane is almost entirely confined to the hot lands, though it appears in the Southern United States and in Spain. Beet-sugar is made chiefly in Germany and France, extending thence into Hungary and Russia and other neighbouring countries; some beet also is grown in the United States. The north-eastern departments of France and the Prussian province of Saxony are the chief European centres, and recently successful experiments have been made in England with this crop, in East Anglia, Cornwall, &c. The sap of the sugar maple or rock maple is used for the extraction of sugar in Canada and the Northern United States; so also is the stem of sorghum or Guinea corn, a hardier plant than the sugar-cane, in China and elsewhere. These products, however, hardly enter into commerce.

Meat and Dairy Produce. Though regional considerations do not strictly govern the distribution of cattle, sheep, and pigs, there are certain regions which are particularly fitted for the raising of cattle and sheep in great numbers for export. The chief exporting countries are the United States and Canada and Argentina, and here the open grassy plains—prairies in the northern, pampas in the southern continent—provide pasture even if the climate is not moist enough for crops. The same business has grown up in New Zealand and Australia, while other countries possessing similar pasture-plains produce a surplus of meat for export, such as Russia with its wide grassy steppes. The export of dead meat from distant countries is rendered possible by the process of canning, or by salting and sun-drying it in the form of the 'jerked beef' of South America. But far more important is the method of cold storage. This is a development only since the last twenty years of last century. But it has enormously influenced the import trade into the United Kingdom and other countries, not of meat only, but of dairy produce, fruit, vegetables, and fish, which 'go bad' more or less quickly if not so preserved. For example, the United Kingdom is able to import butter largely from Australasia in addition to the huge imports from Denmark and lesser imports from other lands. Cheese is imported mainly from Canada. Milk enters into long-distance commerce in the form of condensed milk.

Other Animal Products (from domestic animals) which enter into commerce are horn, hoofs, hides, hair, tallow, catgut (chiefly from sheep), &c. But the most important of these products by far is *wool*. The countries most noted for wool from the point of view of commerce are Australia and New Zealand, Argentina, including Patagonia, together with Uruguay and the Falkland Islands, the United States, Russia, and South Africa. Europe produces more wool than any other continent, but it is mainly used in the countries where it is produced. The merino sheep, the best breed for wool, is of Moorish origin, and was spread through Europe by way of Spain; it has been introduced thence into other countries. Commercial considerations have greatly affected the breeding. Thus, in New Zealand especially, a breed has been aimed at to yield both fair wool, if not of the best, and good meat for the frozen-meat trade, which the merino does not supply. The drier inland sheep-runs of Australia stand by the wool trade alone, for the merino sheep will bear conditions of drought which sheep bred for meat could not bear.

CHAPTER IV

TEMPERATE LANDS (*cont.*)

Forests. Vegetable Fibres. Other Products.

Forests and Forest Products. In the temperate regions forests are characteristic of most marginal lands, but of interior lands only in the higher latitudes or at the higher elevations. Where the tundra merges into the sub-arctic forest belt there is a transitional zone, of varying width, where the forest is thin and the growth of trees stunted. South of this zone (or below it on mountain slopes) the coniferous forest is developed at its full growth. And the conifers of the temperate regions are economically the most important timber trees. It has already been stated that most of Western Europe was formerly forested, but during centuries of settlement by a relatively dense population has largely been cleared of wood. This has taken place where the land is suited and required for agriculture. On the other hand, given inferior soil or unfavourable climate, or both, the forest is more profitable than agriculture, if it is capable of yielding a steady supply of timber. In Europe, then—taking first the cool lands—only Scandinavia, Russia, and Austria produce any considerable surplus of timber for export. The first is a northern land; Russia's export is chiefly from her northern lands, and Austria includes a great extent of forested mountains. Countries such as Germany and France, though well wooded in parts, are not self-supporting in timber, and the United Kingdom and the Low Countries are practically wholly dependent on imported timber. In North America the timber regions are chiefly in the eastern and western margins, and in the interior highland regions of the West. The United States, in spite of a vast 'lumbering' industry, is becoming gradually less able to provide a surplus for export. In the eastern marginal region the same process is going on as has been described in Western Europe. With the closer settlement of the country, much forested land has been cleared for agriculture, and the timber industries tend to become confined, as in Germany and France, to hilly and mountainous districts. It is thus the eastern and western margins in Canada which offer the best prospect of a steady export trade in timber.

As the lumbering industry is carried on chiefly in hilly or mountainous districts, the rivers, if they are large enough, gain an importance as transport-lines which they would not otherwise possess, being generally rapid and interrupted by falls. Timber is a bulky commodity which floats, and can therefore be slid down the valley-flanks or otherwise transported to the river, on which it is launched to be carried down to the saw-mills near the mouth, whence, when cut up, it can be easily loaded for shipment.

The coniferous trees may be broadly classified as supplying the soft woods, as contrasted with the hard woods, of which the following may be mentioned from the temperate forests. Of the European oaks the British is most durable. Canada supplies the white or American oak. The European walnut and the American white walnut or hickory and black walnut; the elm of both continents; the European beech and North American red beech, and the European ash are among other useful timbers. The North American forests are divided into five regions: (*a*) the northern forest of Eastern

Canada and the North-eastern States; (*b*) the central hard-wood forest extending athwart the Mississippi basin between Texas and Pennsylvania; (*c*) the southern forest of the Gulf and South Atlantic seaboard; (*d*) the Rocky Mountain forests; (*e*) the Pacific coast forests. Certain subdivisions are also recognized in the United States. The Pacific forests are noted for trees of great height and circumference, the 'big tree', redwood, and Douglas fir. The tree last named extends to the forests of the Rockies, where also various pines and spruce are cut. The white pine, hemlock, and spruce are characteristic of the northern forests. The hard-wood forests, in which the oak is the most important tree, have suffered more than others from clearing for agricultural purposes, extending as they do over the more populous eastern parts of the country, and growing on the better soils. In the south appear various yellow pines and the cypress. In Europe the northern forests consist mainly of Scotch pine, spruce, and birch. In Central Europe there are forests in which the above trees are mingled with the silver fir, oak, beech, and many other trees. The oak is the most important tree in France, and in the warm Mediterranean region the cork oak appears locally, in Spain, Corsica, the south of France, and Algeria. In the Balkan countries walnut and boxwood appear among the valuable woods. The trees of the Mediterranean region mark the transition from temperate to hot lands; palms, for example, appear on most parts of the coasts. A characteristic Mediterranean tree, however, is the olive, the fruit of which yields one of the most useful of oils. This tree has been successfully introduced into other lands of the mediterranean type (3*a*), as in California, South Australia, and Chile.

The conservation of the temperate forests has become a serious problem, for the supply of coniferous timber shows signs of failure to meet the increasing demand. Apart from clearing for agricultural purposes, ill-regulated cutting and waste of timber has occurred or still does so in important forest regions, and in some countries (but not all) the forests have been placed under careful regulation by the Government in regard to cutting, the preservation of forest 'reserves' and reforestation of disforested lands.

The cool eastern marginal region of Asia corresponds to the same region in North America in respect of forest, but these forests are not of commercial importance. The marginal regions of Australia possess a peculiar and characteristic forest flora. This includes a large variety of eucalypts, some of which provide not only valuable products in their oils, resin, and bark, but also some of the most durable timbers. These timbers, and also those of the turpentine tree and the Western Australian jarrah, are specially noted for the building of piers, etc., in sea-water, resisting both its action and that of marine organisms. There are also various pines, which with red cedar, beech, and others, afford a good supply of soft timber. In New Zealand are found the kauri pine and other trees of commercial value, but there has been much destruction of forests.

There are a number of useful products derived from the woods of temperate forests, chiefly of coniferous trees. Such is wood-tar, which is distilled largely in the North European forest countries, and in the United States especially from the swamp-pine of the south-east. The residuum of this process is pitch, and a further product is creosote. Turpentine is an oleo-resin of various conifers, such as the cluster-pine of the Bordeaux district, the Scotch fir and the swamp pine, and commercial turpentine is the oil distilled from the resin. Amber is a fossil resin, obtained by mining or dredging, chiefly on the shores of the Baltic Sea, but occurring also in Rumania and other lands, and used for ornamental purposes and in varnishes. Kauri gum, also used in varnishes, is dug in New Zealand, being a product of the pine of the same name. Wood has become one of the most important materials in the manufacture of paper, especially in Scandinavia, Germany, and North America. The wood for this purpose is converted into pulp, and the trees chiefly used are the Scotch fir, spruce, poplar, and aspen.

Flax and **hemp** are fibre plants, cultivated and prepared in similar ways and in similar regions. They have a wide range, from cool to hot lands. Their seeds are valuable for oil, and in India both plants are grown for seed rather than for fibre; hemp in hot countries also produces a resin from which certain drugs are prepared. The principal countries growing both plants for fibre, however, are Russia and Italy, and they are also grown in various parts of Central Europe; the flax of the Courtrai district in Belgium and the hemp of Piedmont in Italy are specially noted. New Zealand flax is becoming a commodity of value, especially since an easy way of freeing the fibre of resin has been found. So far as climate and soil are concerned, these plants might be grown more widely than they are, and important manufacturing countries, like those of North-east Ireland and Scotland for linen, might be supplied with much more locally-grown flax than they now receive. But the cultivation of the plant and preparation of the fibre can hardly be carried on commercially where labour is not very cheap, for both processes involve much labour. Flax-fields have to be very carefully weeded; the plants when gathered have to be pulled (not cut), then rippled or cleared of bolls, and retted or rotted by a long process of careful soaking in water, after which the fibre is scutched or separated from the core. A rapid process of retting has only recently been the subject of successful experiment in Ireland. Flax fibre is made into linen, lawns, cambric and other materials, and from the shorter fibres or tow cord is manufactured. The coarser hemp is the material for canvas and ropes. Flax seed or linseed and hemp seed, besides yielding oil, are crushed and made into cattle food; they have also medicinal uses.

Cotton, the most important of all vegetable fibres, is the product of a plant native in hot lands. But though the cultivation is carried on in many such lands, over three-fifths of the commercial supply of the world comes from a particular warm region—the South-eastern United States. Moreover, when cotton is grown in hot lands it is generally (not invariably) at some considerable elevation. Broadly speaking, the cotton-growing regions of the world lie between the northern and the southern annual isotherm of 60° Fahrenheit.

The climatic requirements of the cotton crop are six or seven months of warm hot weather, with freedom from any frost, and a moderate supply of moisture. Too much moisture is destructive, unless in a very dry climate like that of Egypt, which counteracts the flooding to which the cotton plantations are sometimes subject there. The monsoon type of climate is suitable, therefore, provided that the plantation is not within the range of the heaviest monsoonal rains or winds; this provision, as will be seen later (p. 70), is fulfilled in the Indian cotton districts. The climate of the warm eastern margin of the United States is of weak monsoonal type. The rainfall ranges from about 3 inches monthly in April and May, the usual sowing and early growing season, to 4½ inches or more in July and early August, but September and October, when most of the cotton is picked, are drier. Compared with climatic conditions, character of soil is of minor importance. The Mississippi bottom lands and the black soils of Texas and Alabama, however, are specially favourable; and the very long-stapled cotton called 'sea-island', from its cultivation on the islands of the coasts of Georgia and South Carolina, appears to benefit from the saltness of the soil and air.

The picking of the cotton is light work, but difficult and costly unless labour is very cheap; it is afterwards ginned, this process separating fibre from seeds. It was only in the second half of last century that the American growers found use for cotton seed. Now it is pressed for oil, the best quality of which is a food oil much resembling that of the olive. Other uses are in soap and candle-making, and in preparing the surface of phonograph records. The crushed seeds and their husks are both good foodstuffs for cattle; they are also useful as manures. Thus the cotton plant can be manured with its own crushed seed, as this contains most of the constituents which the plant draws from the ground.

Cotton is grown to some extent in all divisions of the warm regions of the northern hemisphere, except in interior highland or mountain regions (3*d*, 3*e*). There is an extensive cultivation in the eastern marginal lands of Asia (as in North America)—in China, Korea, and Japan. Some of the European Mediterranean lands grow it—such as Cyprus, Malta, and the Smyrna district—but in none of these does the production approach that in the Egyptian delta. In the interior lowland of Russian Central Asia there is a large cultivation, supplying other parts of the Russian empire. A little is grown in Australia, Fiji, and Tahiti.

Esparto, Spanish grass, or alfa, is essentially a Mediterranean product, being grown in Southern Spain and North Africa. It has long been used for rope and basket-making, but has later become an important material for paper-making.

Silk, the material with which the silkworm or caterpillar of the silk moth encloses its cocoon, is another product mainly of warm regions. The food of the worm is the leaves of the white-fruited or other mulberries. The chief seat of the industry is its original home in the eastern marginal lands of Asia—China and Japan. Among the European Mediterranean lands, Italy and France are the chief producers; Asia Minor and Syria also export silk. A genial climate in spring and early summer is essential, for at this time the worms are reared from the egg to the cocoon. They bear a temperature ranging from 62° to 78° Fahrenheit, but either lower or higher temperatures are bad for them. Thus Japan, with less regular temperature conditions than China, provides a supply of silk less regular in quantity.

Tobacco. The production of tobacco is very widely distributed, but by virtue of largest production it may be regarded as belonging primarily to the warm regions, and, within these, to marginal regions. The United States produces more than any other country, chiefly in a group of Eastern States, from Florida northward to New York. The plant is of Central or South American origin; the cultivation began in Virginia, and that State gives its name to a certain kind of tobacco, though in production it is surpassed by Kentucky and other States. In the European Mediterranean region we find an important cultivation, under government monopoly, in

Turkey, carefully guarded, as even the export of seed for planting elsewhere is forbidden. Tobacco is also cultivated in Greece, and the well-known Egyptian cigarettes are manufactured largely from this crop, the industry having been established in Egypt in order to avoid a paper monopoly in Greece. There is also a large cultivation in Italy, and, among more northerly marginal lands, especially in France. The most northerly range in America is to the north shore of the St. Lawrence, in Europe to South Sweden. In South Africa, Chile, and the Eastern States of Australia the cultivation is more or less important, and in the hot lands it is widespread (chap. v). The character of the leaf is greatly affected by differences of climate and soil. Broadly speaking, warmth and comparative dryness enhance the quality; thus in Cuba the crop is a winter one, the summer moisture being excessive. On the other hand, perique tobacco, peculiar to Louisiana, appears to require rather damp conditions during ripening. Again, it is of interest to notice that it has been possible to reproduce in the United States, by artificial shading, the high quality of the Sumatran leaf (noted for cigar wrappings), which is grown under trees. As regards soils, a heavy clay yields a heavy tobacco; a light sandy soil yields a light leaf, such as Virginian. Climatic conditions are also of no little importance in connexion with the processes of curing the leaf.

The poppy, of which the juice furnishes **opium**, is capable of cultivation almost anywhere, from temperate to hot lands, but a moderate rainfall and warm climate are most suitable. Turkey (principally Asia Minor) supplies most of the European and American demand; Persia to a lesser extent. India, mainly Bengal and the United Provinces, supplies China, where the consumption and also the home cultivation were enormous until in 1906 the gradual abolition of the opium 'habit', with all its evils, was undertaken by the Government. It may be noted that the elevated plantations in the Himalayan districts of India appear more valuable for the production of morphia (an opium alkaloid) than those of the low plains. Most of the **camphor** of commerce is the product of the camphor laurel, an Asiatic tree of the warm east marginal lands.

CHAPTER V

HOT LANDS

(Regions under Groups 4 and 5.)

Food Products. Vegetable Fibres. Forest Products, &c.

THE hot lands (4, 5) are capable of a simpler classification according to vegetable products than the temperate. The deserts (4 *a*) are of course among the least productive of lands. The equatorial lowlands (5 *a*, 5 *b*), hot and more or less rainy at all seasons, are regions of great tropical forests. They yield many valuable commodities which are summed up in the term 'forest products', but they offer little, if any, opportunity for agriculture. The principal agricultural lands among the hot regions are in those regions which are classified as the Indian and Sudan types (4 *b*, 4 *c*). Summer rains are generally characteristic. Over the typical monsoon region of India and South-eastern Asia the winds draw outward from the land to the sea in winter, which is the dry season; in summer they draw inward from sea to land, and summer is the wet season. In the hot lands the effect of elevation on vegetation is naturally more strongly marked than in temperate lands, because the possible range is greater. From base to summit of a mountain-system in a temperate region the range is only from temperate to the equivalent of polar conditions. But from base to summit of mountains within the latitudes of hot lands the range may be from tropical to polar conditions if the mountains are high enough, passing through the equivalent of warm and cool temperate conditions on the way. This may be illustrated from Peru, Chile, and Bolivia, where on the slopes and plateaus of the Andes there is a rapid transition from desert conditions on the coastal lowlands (4 *a*) to those of the Tibetan type (2 *b*) on the higher plateaus, and there are cultivated, according to elevation, such crops as sugar, cotton, maize, wheat, and barley, the last of which has been seen to have an extreme northern range to 70° N. Higher, again, are found the characteristic mountain pasture lands.

FOOD PRODUCTS, &C.

Rice is the most important food-grain in hot lands. It is characteristic in the first instance of the Indian (monsoon) region of South-eastern Asia (4 *b*). Thence it extends northward along the warm temperate coast lands, especially Japan, and southward into the scanty cultivable lands of the Malay Archipelago. China and India are thus the chief rice-growing countries. In India the principal rice lands are in Bengal, Madras, and Burma. Elsewhere rice is grown in many hot and warm lands. In America it appears in lands akin to the Indian type—Central America and the West Indies, extending thence northward into Florida and other States of the Gulf coast and the Lower Mississippi valley. In Africa it appears in various lands of the corresponding type and the Sudan type (4*c*), such as Madagascar, the coast lands south of Zanzibar, about Lake Tanganyika, in the Niger valley about Timbuktu, and elsewhere, and in the Egyptian delta. In the European Mediterranean region it is grown chiefly in Northern Italy, in the lowland of the Po. A little rice is grown in Bolivia, where in the lower parts the Sudan type of climatic conditions is reproduced. But it is with the Asiatic monsoon lands that rice cultivation is chiefly identified. As a staple food-grain, it affords a remarkable contrast to wheat, the chief staple in temperate lands. It has been seen that in the most densely populated temperate lands men tend to draw their chief wheat supplies from far-distant fields. But in the monsoon lands the most densely populated lands—which are among the most densely populated in the world—practically coincide with the rice lands. The accompanying map (Fig. 8) should be contrasted with Fig. 6. A contrast was drawn in the first chapter between the commercial activities of man native in temperate lands and the absence of such activities among natives of hot lands. Now the contrast may be explicitly illustrated as between wheat-eaters and rice-eaters. When account is taken of the vast population of the Asiatic monsoon lands, it will be realized that the rice-eaters form a very large proportion of mankind. The proportion has been placed as high as one-half, an obvious over-estimate; but it appears to be not much less than one-third. As the bulk of rice is consumed in the country where it is grown, the commercial proportion or supplies exported is small in relation to the total crop.

While certain varieties of rice are suited to comparatively dry soil and upland cultivation, the best is grown on low lands, as along the plain tracks or in the deltas of

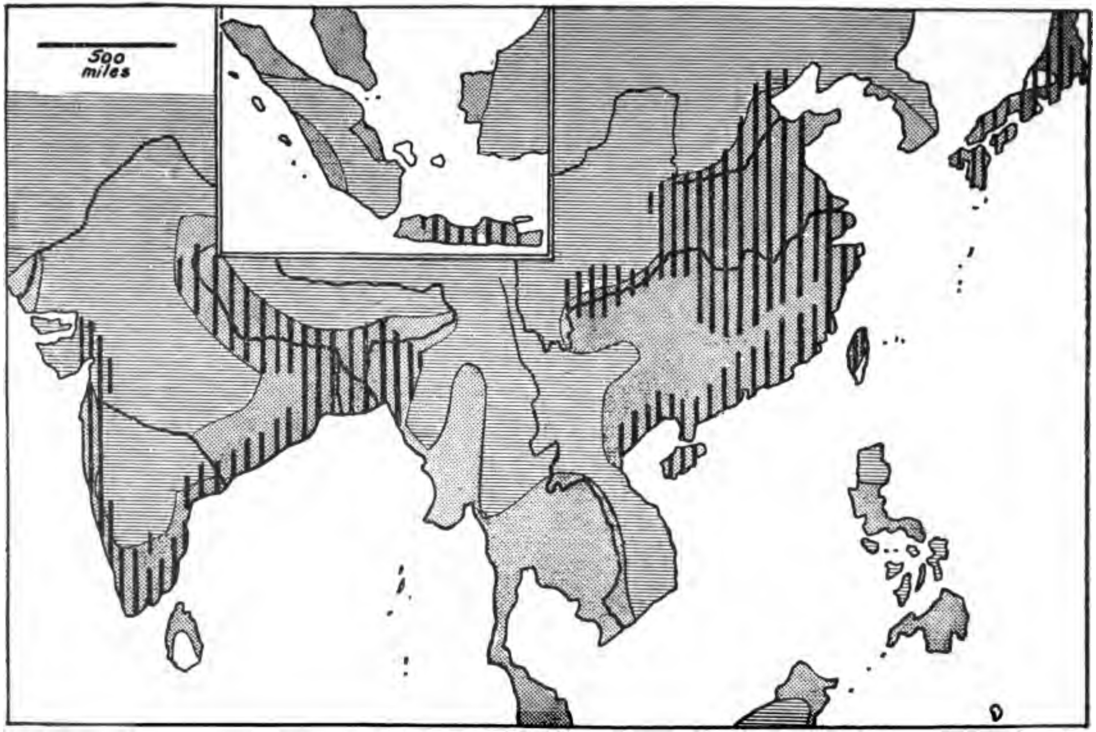

Fig. 8. South-eastern Asia, showing the rice lands (shaded with fine *dots*) and the most densely inhabited lands (shown by the heavy vertical lines), which coincide closely with rice lands.

large rivers—alluvial lands subject to flooding, or else irrigable lands. During growth plenty of rain is required, and the monsoon type of climate, with its heavy rainfall in summer, provides it. Rice is, in other respects, the crop best suited to a very dense agricultural population. It is extremely prolific, and two harvests in the year are common. Its cultivation is easy, requiring neither special tillage nor rotation. In food-value rice is much inferior to wheat—a fact which is not without interest as bearing on the contrast between the rice-eaters and the wheat-eaters. Rice is much used in the making of starch. The well-known Japanese drink *saké* is distilled from it, and other liquors are made from it elsewhere. Its straw is a good fodder.

The Sugar-cane has a geographical distribution strongly resembling that of rice. It is essentially a tropical product, requiring a damp soil and warm moist climate to afford the best yield. Thus though its cultivation extends northward from the Central American region into certain Southern States of the Union (chiefly Louisiana)—that is to say, into the southern parts of a warm temperate region—the climatic conditions are less favourable to the formation of sugar in the canes here than in warmer countries. The weight of sugar will be only from 7 to 9 per cent. of the weight of the canes, whereas under the most favourable conditions the percentage rises to 12 or 14. The chief producing countries are India, Java and China, Cuba and other West Indian islands, Guiana and Brazil, the Hawaiian Islands, and Mauritius; though various other lands, principally of the monsoon type, such as the coast lands of Queensland and Northern New South Wales, produce a considerable quantity. The Asiatic production, as a whole, is much larger than the American; but the

American production is of greater importance in commerce. All the sugar produced in India is consumed there, and more is imported.

The sugar-cane is a perennial plant, so that it has not to be planted every year. Its cultivation is not difficult, but irrigation is necessary where the rainfall is not heavy. Thus in Hawaii, where a very high percentage of sugar is obtained from the cane, owing to peculiarly suitable soil and favourable climatic conditions, an elaborate irrigation system is necessary. The average rainfall is about 28 inches annually, but is somewhat variable, occurs chiefly from January to May, and is very much lighter on the leeward side of the islands, where the best soil is generally found, than on the windward.

When beet-sugar began to be produced in European temperate lands on a large scale, which was not until the second half of last century, the governments, to encourage the industry, introduced duties on imported and bounties on exported sugar. British colonies exporting cane-sugar suffered in consequence and the bounty-system has been the subject of much international discussion.

Palm sugar, known as jaggery or khaur, is derived from the sap of several palms, notably the date palm of Northern India. It enters little into commerce.

Other Agricultural Products (Indian and Sudan-type regions). With the very important exception of the Indian wheat crop, it may be said broadly that, as the great bulk of the rice crop is consumed locally, so the lands of the Indian and Sudan types produce food-grains for home consumption only. Wheat and barley are grown in small quantities, at suitable elevations and under other favourable natural conditions, in many such lands where their production is not necessarily restricted by such conditions. It has been asserted, for instance, that the Sudan, properly settled and farmed, could supply all Europe with wheat. Maize again, naturally a grain of the warm regions, is pretty widely distributed in hot lands. But none of these lands, in the production of food-grains, is commercially of such importance as India.

The principal *Indian wheat-fields* are in the Punjab, where vast schemes of irrigation (chap. x) have opened great tracts to cultivation. The United Provinces and the Central Provinces have also a large acreage under wheat. The crop is generally a winter crop; that is to say, it is grown in the cool season and harvested in February and March. The quantity available for export fluctuates. In one year India has supplied a greater amount of wheat to the United Kingdom than any other country. On the other hand, within five years recently, one year's value of the wheat export to the United Kingdom has ranged up to nearly eight millions sterling and down to a million and a quarter. A considerable amount of maize is grown for local consumption. But the staple food-grains other than rice and even more widely used are millets, among which sorghum (durra) is the chief, as in the Sudan and other African lands of this type. Spiked millet is a poorer grain grown on poor soil. Gram, one of the pulses, is another food of the poorer classes.

Oil-seeds form valuable crops in India, the oils meeting not only with a large local demand (whether for food, anointing, medicinal purposes, or lighting), but also supplying an export trade to Europe, especially France. The most important are those of mustard or rape seed, linseed (flax), gingelly (sesamum), and the castor-oil plant.

Tea is essentially a product of the monsoon lands of South-eastern Asia. There seems no doubt that the original home of the tea-shrub was in these lands, and under cultivation it has extended comparatively little outside them. The great producing countries are India, China, Ceylon, Japan, Java, and Formosa. In India the chief centre is the hilly country bordering the Brahmaputra valley in Assam ; in China, a south-central group of provinces, on or near the seaboard—Kiangsi, Fukien, Chekiang, &c. The best climatic conditions are great warmth, and moisture to foster a strong growth of leaves. The former belief, that relatively temperate conditions and steep hill-sides were best, has resulted in failures in tea-cultivation. A well-drained light soil, however, is necessary. Tea-planting has made some little headway, outside the monsoon and adjacent countries above named, in Natal and Russian Caucasia ; it has also been attempted in the West Indies, Brazil, and Australia.

The tea trade, being concerned with the distribution, practically all over the temperate lands, of a commodity from one particular region, is associated with some curiosities of transport. It was this trade which in the middle of last century called into existence the famous 'China clippers'—high-speed sailing ships which by way of the Cape of Good Hope brought tea to the English markets with the least possible delay. The brick-tea, or tea compressed into the form of bricks, was and still is produced in large quantities in China because this process reduced its bulk to a minimum, a consideration of first importance to the system of caravan transport to Russia and Tibet. This form of tea is unknown in our own and other countries which are served by sea-transport. The black tea most familiar to us, and the green tea more commonly used in America, are obtained merely by different methods of preparing the leaf.

Maté or Paraguay tea is produced from the leaves of an ilex which flourishes in Paraguay and Southern Brazil. This tea is widely used in South America.

Of the three products of hot lands which are most familiar to us as articles of drink—namely tea, coffee, and cocoa—tea, even though best suited by really tropical conditions, is the hardiest plant; it ranges from sea-level to 7,000 feet of elevation, and ranks strictly as subtropical. Coffee occupies an intermediate position in this respect between tea and cocoa, which is a strictly tropical plant.

Coffee is obtained from a shrub or tree indigenous in Abyssinia, bearing a berry containing two seeds, the familiar coffee-beans of commerce. It is generally grown on well-watered slopes at elevations from 1,000 to 4,000 feet, and requires a mean annual temperature of 65° to 70° Fahrenheit, though the Liberian coffee will flourish at lower altitudes. The chief trade has shifted away from its original centre. This was Yemen in Arabia, which supplies the celebrated Mocha coffee, but the export from that country now goes mainly to other parts of the Turkish Empire. Brazil is the chief producing country, the centre of production being in a group of States in the south-east—São Paulo, Rio de Janeiro, and Minas Geraes. Coffee is also cultivated widely elsewhere in South America, in Central America, northward to Mexico, and in the West Indies. In India we find it principally in the south, in the elevated districts of Mysore, Coorg, &c.; it is also produced largely in Java and other islands, but has been in great part replaced by tea in Ceylon. African coffee does not enter much into commerce, though it is of some importance in

Nyasaland. A limited amount is grown in Queensland and in Hawaii.

Cocoa is more closely restricted in distribution; it may be termed an equatorial product. The small tree bears pods containing a number of seeds or beans; the product has no connexion with the coco-nut, and the more proper form of its name is cacao. The tree is cultivated at lower levels than coffee; it demands a mean annual temperature of 80° and a heavy rainfall—50 inches or more—with no long dry season. It is indigenous to tropical America, and is produced mainly in Ecuador, Brazil, Trinidad, &c.; in the African island of San Thomé and in the Gold Coast, and to a limited extent in Ceylon and the Malay Archipelago. Cocoa, besides its use as a beverage, is the basis of chocolate, and the fat of the beans, or cocoa-butter, has various uses in pharmacy.

Both the coffee and cocoa plants require shading in early growth, and between the rows of them bananas and various other profitable crops are grown for this purpose.

Other Food-products, &c., of hot lands.—The cassava or manioc is a plant with large tuberous roots, from which a kind of meal is prepared. The product appears in temperate lands in the familiar form of *tapioca*. The plant is native in Brazil, but has been introduced into West Africa, the Malay Archipelago, and elsewhere. There are two sorts of the root, a bitter and a sweet. The bitter is of more importance commercially, though a poison has to be removed from the root by pressure and heat in preparing the product. The sweet cassava is not poisonous, and is eaten as a vegetable. From the roots of various tropical plants *arrowroot* is prepared; the true arrowroot is of American origin, and is produced especially in the West Indies.

Of the great number of useful products which are yielded by the different palm trees, that of *sago* is one of the most familiar. Several kinds of palm yield it, in South America and elsewhere, but principally the sago-palm of the Malay Archipelago. This is essentially a tree of equatorial type; it flourishes best in low marshy ground, and yields its product with easy preparation. The commercial demand for sago has caused the sago-palm to take its place among those tropical trees and plants which are not only worked in their wild state, but are reared in plantations.

Among tropical *fruits* there are not a few of which most dwellers in temperate lands only hear with envy, owing to the difficulty of transporting the fruit over long distances. Important exceptions are the *banana* and *pineapple.* The large herbaceous plant which bears the banana requires a hot damp climate. Its extreme northern limit of cultivation is found in Florida, Egypt, and Southern Japan; its southern limit in Natal and Brazil. The banana trade is of particular importance to the West Indies. The *orange,* a natural product, as we have seen, of the Asiatic monsoon region, is also largely cultivated in the West Indies, Brazil, Queensland, &c.

The *date-palm* is a characteristic product of the desert regions (4*a*) in Asia and Africa, ranging from India through Persia and Arabia to North Africa. It does not ripen its fruit on European Mediterranean shores, but it has been introduced into the dry lands of Mexico and the south-west of North America. The dried fruit, familiar in temperate lands, has little of the delicious flavour of the fresh fruit. The timber, leaves, and fibre of the tree are of great use in the countries where it is grown, but in general utility this palm is surpassed by the *coco-nut* palm. This tree has a very wide range in hot lands. Its most characteristic and luxuriant growth is on the sea-shore, as in the Pacific islands. The fruit or nut, which floats and is not affected by long immersion in the sea, has been naturally transported by ocean currents. The kernel and the bud or 'palm cabbage' as foods; the juice or 'milk' within the nut as a drink; the oil pressed from the dried kernels, which are exported in the form of 'copra'; the 'coir' or fibres from the covering of the nut, used for making mats, brooms, &c.; the timber; a juice from the flowers called 'toddy,' and boiled down for sugar or distilled for the spirit known as arrack—such are the main products and uses of this tree. Ceylon and Madras yield the principal export of coco-nuts to the United Kingdom.

In the yield of *spices* the lands of the monsoon type take the first place, and particularly the Malay islands and adjacent lands and West Indian islands. Thus pepper comes from Penang, Borneo, Riouw, Siam, and other lands in the vicinity of Singapore, which has a large export trade in it, as well as from Southern India. Ceylon and the archipelago are noted for cinnamon, which has been introduced into the West Indies, &c.; ginger, native in South-eastern Asia, has been similarly introduced into the West Indies, West Africa, and elsewhere. Nutmegs and cloves come from the Moluccas (also called the Spice Islands), and notably from the Banda group. Among the products of the West Indies may be mentioned allspice (pimento), while Mauritius and other islands of the Western Indian Ocean take a leading place in the supply of vanilla.

The production of *tobacco* in hot lands again illus trates the similarity of products between the Asiatic and West Indian regions of the Indian type (4 *b*). Thus the chief producing lands in this instance are Cuba, Jamaica, and other islands, with Mexico, on the one hand, and Sumatra, Borneo, and other islands, India (especially Bombay, Madras, and the Punjab) and Southern China on the other.

Quinine.—This is the chief of various medicinal extracts from the bark of the cinchona trees, used as a cure of or guard against fever. The tree is characteristic of the equatorial region of South America. Requiring plentiful rain and steady temperature ranging up to 70° Fahrenheit, it is found mainly at elevations from 5,000 to 8,000 feet, though ranging 3,000 feet higher or 2,000 feet lower. Its range is roughly from Bolivia to the north of the continent. Growing singly or in small clumps only in the dense forest, the wild trees are not easy to find or to work upon when found; there is therefore the greater tendency to strip the bark recklessly, spoil the tree, and finally reduce the supply. These considerations, coupled with the importance of a good supply of quinine against fever in tropical lands, have caused cinchona plantations to be established elsewhere. An early attempt to do so in Algeria failed, but the tree has been introduced in Java, India, Ceylon, Jamaica, &c.

VEGETABLE FIBRES, FOREST PRODUCTS, &c.

Cotton. India, providing almost 19 per cent. of the world's commercial supply, is the principal cotton-producing country in hot regions, followed by Egypt with about 7 per cent. In India the crop is grown, not where the full monsoonal rains reach it, but rather on lands at the opposite end of the scale as regards rainfall. Thus some of the principal cotton lands are found on the plateau eastward of the Western Ghats, which shelter it from the heavy rains; but the black cotton soil retains moisture in a remarkable way. In Egypt the cotton crop, like others, depends on the irrigation supplied by the Nile; almost the whole is grown on the black, heavy alluvial soil of the delta. Experiments have been and are being made in several countries with a view to establishing a cotton crop on a commercial scale. Thus the West Indies supply a fine quality of sea-island cotton. Mexico, Brazil, and Peru grow cotton. In Africa, Nigeria (where there is also a large native manufacture), the Anglo-Egyptian Sudan, British East Africa and Nyasaland have all shown promise as cotton-growing countries. Some cotton is grown in Java.

Jute stands next after cotton and flax in importance among the vegetable fibres, and this is essentially a product of the lands of Indian type, or more narrowly, of India itself, which supplies the best quality. Hot and moist conditions are required. The plant is an annual, and too heavy rain in the early stages of growth is bad for it, but it stands flooding, and is grown on alluvial lands, as in Bengal, where the crop is not liable to be spoiled by long drought. It is grown similarly in China and in Egypt, as well as in Ceylon. The fibre is used chiefly for gunny-cloth and other coarse materials. The leaves are used locally as food.

The hot lands are rich in a variety of vegetable fibres. There may be mentioned the Manilla hemp (from a plant of the banana kind), supplied as its name indicates from the Philippine and neighbouring islands; the China grass, ramie or rhea (from a plant of the nettle kind), grown not only in China but in India and the archipelago, Mexico, North Africa, and to some degree in Central Europe; and henequen or sisal hemp, from an agave, a Central American product. The silk cotton tree, from the covering of its seed, supplies the 'vegetable down' used for stuffing cushions, &c. The coir of the coco-nut has already been mentioned as a material for mats and brooms; the Brazilian piassava is another fibre used for the latter purpose.

Timber. The forests of hot lands, particularly lands of the monsoon type, supply certain valuable hardwoods. The familiar names of ebony, rosewood, and cedar are applied rather loosely to the timber of various trees. Central America and the West Indies are the main source of mahogany. Burma and Southern India supply teak. India is an example of a country where, after the forests had suffered severely from reckless cutting, a careful management of the forests has been undertaken by the Government. The greenheart of the Malay Archipelago, a very heavy wood and one of the strongest, is of value particularly in marine construction. It is also a favourite wood for fishing-rods.

Rubber has become commercially the most notable product of the equatorial forest regions. It took its name from the early discovery that it would rub out pencil marks; the name of India-rubber indicates that the knowledge of it was obtained not from India but from the South American Indians. Its use as a waterproofing material raised the demand for it, but in recent years this demand has been enormously increased by the rise of the manufacture of rubber tyres. Rubber is a product of a number of tropical trees and climbing plants or vines. These on being cut or tapped yield a latex or juice. This is not the sap of the plant. It resembles milk, and like milk (though probably not by the same natural process) separates, if left standing, into a cream and a watery fluid. From the cream rubber is prepared by processes of which the last is vulcanization, a treatment with sulphur under heat. This, if carried to excess, blackens and hardens the rubber into the material known as ebonite.

Of the world's rubber supply about half comes from South America (Amazon basin, &c.), a third from Africa (Congo basin, &c.), the remainder is mainly Asiatic, from Ceylon and the Malay Peninsula and islands. As in the case of other forest products for which there is a large commercial demand, the rubber trees and vines in their natural state have suffered from reckless cutting. When a product is collected from here and there within a vast area of tropical forest, it is no easy matter to control the methods of procuring it, and to ensure that this is carefully done. Thus although the production of 'wild' rubber is as yet more important than that of 'plantation' rubber, plantations are increasing in number and importance. This is especially the case in the Asiatic lands, where the number of wild rubber-yielding plants is not so great as in America or Africa. Not only, however, in Ceylon, Malaysia, Burma, and Southern India, but in the Congo region and West Africa, and in tropical Australia, rubber plantations are being formed. The best quality of rubber is known as Para, from the chief port of export for the Amazon basin. The tree (of the genus *Hevea*) from which it is mainly obtained grows best under extreme tropical conditions; on wet alluvial slopes by the rivers, under temperatures with an average daily range from 73° to 93° Fahrenheit or more. The collection of rubber is carried on not only in Brazil but in Peru and Bolivia, and countries north thereof to Central America. An important rubber-yielding tree which flourishes where the hevea will not grow is a manihot (related to the manioc or cassava). It flourishes in North-eastern Brazil on rather dry soil at elevations up to 4,000 feet; it yields the rubber known as Ceara, and it also has been planted in Ceylon, India, and East and West Africa. The castilloa tree is characteristic of Peru and Central America; it has been introduced into the West Indies as well as African and Asiatic plantations. The tree requires much moisture and a low situation. Other sources of rubber are too many to mention, but it is clear that there are possibilities of extending its culture under a variety of conditions.

Waxes, Gums, Dyes. Among other products of forests in hot lands there may be mentioned the wax-yielding trees, such as the palm which bears on its leaves a powder distinguished as Brazilian wax. From the seeds of another South American palm vegetable ivory is made. There are also the various gums and resins, like gum arabic, from a North African acacia, dammar (used for varnishes) from a Malaysian conifer, and lac, best known in the form of shellac, and produced by the action of an insect on the branches of certain trees, principally in India. Then there are the dye-stuffs, such as the logwood of the West Indies and elsewhere. An enormous number of vegetable dyes are known in India. The chemical production of dyes has caused the decline of the cultivation of some plants for dyes, notably the Indian indigo.

CHAPTER VI

FISHERIES. ZOOLOGICAL REGIONS.

Fisheries. The world's great sea-fisheries fall into a regional division not unlike that of marginal lands. By far the most important fishing grounds are those of the shallow seas fringing the cool temperate marginal lands. The fishing grounds best known to us occur in the North Atlantic Ocean, in parts where there is a large extent of shallow water over a broad continental shelf. Thus the shallow North Sea on the European side and the Newfoundland banks on the American are centres of the fishing industry. There are also, in the corresponding latitudes of the Pacific, important fisheries carried on chiefly by the Japanese. The fisheries of the United Kingdom (mainly England) and the United States (mainly the New England States) are the greatest in the world, and the annual value of their products is roughly equal. In Europe, Russia, France, and Norway have the largest fishing industries after the United Kingdom; those of Germany, Holland, and Denmark among the cool lands, and Spain, Portugal, and Italy among the Mediterranean lands, though important, are much smaller. We have seen (chap. ii) that the North Atlantic fisheries extend far into Arctic waters on the European side—to the shores of Iceland, all round the north coast of Scandinavia, and into the Barents Sea (commonly known as the White Sea fishing ground). With the largely increased use of steam-engines in fishing vessels in recent years, especially by British fishermen, increased advantage has been taken of distant fishing grounds which are found more profitable than waters nearer home. The principal fish of the English fisheries, taken in the order of weight landed on a yearly average, are herring, haddock, cod, plaice, mackerel, hake, pilchard (for which the Cornish fisheries are particularly noted), ling, halibut, turbot, and sole. Lobsters and crabs are the principal shell-fish, together with oysters, which have a more southerly distribution, Whitstable and other places on the east coast of England being noted for them, as well as Brittany and the shores of the Bay of Biscay farther south.

The Norwegian grounds yield chiefly cod and herring, besides salmon. The salmon fisheries are important not only here but in Scotland and Ireland. This fish, of course, periodically enters rivers, and is one of the chief of game fish taken by anglers. The commercial catching of salmon has been affected by this consideration, sportsmen being willing to give such prices for the right to fish as may make it profitable for the owners of the fisheries to stop netting the salmon in the rivers or off their mouths. On the west coast of North America (Alaska, Canada, and the Northern United States), however, there is a great commercial salmon fishery, and connected with it an important industry in canning the fish. The Russians, besides their northern fisheries, have others in the Sea of Azov and the Caspian. Large quantities of sturgeon are taken, and from their roes is prepared the delicacy known as caviare.

Canada and Newfoundland have a share (smaller, however, than that of the United States) in the Atlantic sea-fisheries of the Banks and adjacent waters. Many French fishermen also work there. The Newfoundland banks extend south-east of that island to 50°–48° W. before the sea-floor sinks steeply to great depths. The cod and halibut are the principal fish here; elsewhere in St. Lawrence and New England waters, herring, mackerel and other fish are found in addition. Farther south the shad, alewife, and menhaden (a fish yielding a useful oil) are taken, and the oysters of Chesapeake Bay are famous. There are large fisheries in the Great Lakes, the whitefish of which are particularly esteemed.

The Japanese fisheries range from the Sea of Okhotsk to Australia. The Japanese also have taken no small share in the Western Canadian salmon fishery. The fish of chief importance in their own seas of the temperate regions include the bonito, cuttle, mackerel, tunny, cod, sole, mullet, eel, and salmon, out of a very large variety, among which many are unknown to us. The Chinese have extensive fisheries too, but they also import largely from Japan. The trepang or bêche-de-mer, a kind of sea-slug, is esteemed by the Chinese as a food, and fisheries for it extend from Malaysia through the Pacific islands to California.

Among the fisheries of the Mediterranean Sea those for the tunny, sardine, and anchovy are valuable. The Mediterranean contains a notably small variety of fish. The collection of sponges is carried on in the Aegean and Eastern Adriatic seas and off the shores of Tunis and Tripoli. There is a corresponding sponge fishery in the waters of the Bahamas and Florida.

The Mediterranean (especially Italy) is also the chief centre for the commercial collection of coral. In this connexion it may be observed that articles of marine origin used for ornament are characteristic products of the warm seas. Thus the marine turtle, which yields tortoiseshell, has a very wide range on tropical coasts. The best quality of the shell comes from the Malay Archipelago (particularly Celebes, New Guinea, and intermediate islands); the West Indies and Brazil also supply it largely. Pearls are formed by certain molluscs by a process of secretion which in nature takes place probably round a dead parasite. The chief pearl fisheries are found in the Malay seas, on the West Australian coast, to the north of Ceylon, in the Persian Gulf (with other fisheries near Karachi, at the Bahrein islands, and in the Red Sea), at Margarita Island and elsewhere in West Indian waters, in the Gulf of California and the Bay of Panama, and in some of the lagoons of the Pacific islands. Mother-of-pearl has a similar but less local range. Pearl mussels are found in a number of western rivers in Europe and America, and especially in Germany and in China. The Chinese cause river mussels to form pearls by inserting in them some nucleus, even tiny metal images of Buddha.

The food-fisheries possess more or less of local importance in most maritime countries and islands, and in many of the densely inhabited hot lands—India, for example—their importance is great, and the variety of fish used for food is very large in comparison with that found in the temperate seas. The artificial rearing of fish in confined waters is carried on to some extent in the Mediterranean, as it was by the ancient Romans. Oysters are bred by this method, and it appears possible to apply it to unconfined waters, as young plaice have been successfully established in North Sea waters (Dogger Bank). Another method, of stocking with eggs or small fry the much-fished North Atlantic grounds, has also been attempted. Eggs of trout, shad, and other fish have been introduced into rivers where such fish do not naturally live, and the carp, one of the very few food-fishes which can be bred and reared in captivity in the sense in which the domestic animals are, supplies an industry of some importance in China and in Germany.

Other Marine Products. Of the many other commercial products of the sea some notice should be taken here. The oils obtained from marine animals and fish are numerous. Such, besides those from the whales and other Arctic animals, are those of the dugong, grampus and porpoise, cod, hake, haddock, menhaden, herring, sturgeon, shark, and many other fish. Sepia is prepared from the fluid of a cuttle fish. From the swimming bladders of various fishes isinglass is prepared, for use in clarifying wines and beers, in confectionery, in making cements, and for other purposes. Three principal kinds are distinguished as 'Russian' (a product of the Caspian and Black Sea fisheries), 'Penang', and 'Brazilian'. Leathers are made from such skins as the seal and porpoise, and the ornamental leather called shagreen from those of the shark and ray. Seaweed of various sorts is used as food in Japan, China, Malaysia and other lands; also as manure; it is burnt for kelp (as in Iceland and Scotland, the Channel Islands and Brittany), from which iodine is made; it has other chemical uses also. Salt is produced by the evaporation of sea-water on a large scale in many lands.

Zoological Regions. Students of zoological distribution or zoogeography have divided the world into series of great regions according to differences in their fauna. This division will be outlined here for the sake of establishing a connexion between it and the physical regions. These regions have not such a close relationship with climate as have the vegetation regions. The fauna of Madagascar, for instance, differs so widely from that of the neighbouring continent of Africa that it is sometimes assigned to a separate region. In connexion with the zoological regions the distribution of the fur-bearing land animals and of the birds yielding valuable feathers may be briefly considered. Various authorities vary the divisions, but the map (Fig. 9) shows a well-recognized system of animal realms. Another division may also be quoted, as the names (some of which differ from those of the 'realms' illustrated) are commonly met with: *Holarctic* region, covering the greater part of North America and Northern Europe and Asia; *Sonoran* region, Southern North America; *Mediterranean* region, the Mediterranean and adjacent lands of Europe and

Africa, extending thence in a wide belt to China and Japan; *Oriental* region, India, Farther India and Malaysia; *Neotropical* region, Central and South America; *Ethiopian* region, Africa except that part included in the Mediterranean; *Malagasy* region, Madagascar; *Australian, Polynesian,* and *Hawaiian* regions.

The best furs, such as those of the marten, fox, ermine, musk-rat, mink, otter, beaver, and squirrel, are mostly obtained from northern countries. The winter coats of animals in these countries are the most valuable, and the harder the winter the better the fur. These considerations result in a strongly marked contrast, commercially, between the Holarctic region, the richest in fur-bearing animals, and the Mediterranean, the poorest. In the Oriental, Ethiopian, and Neotropical regions we find the large animals whose pelts are valuable, but practically none of the smaller, though the South

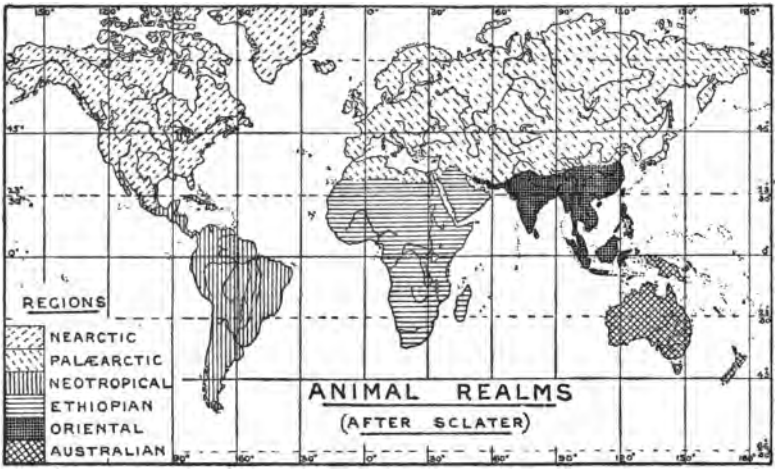

Fig. 9. Animal Realms.

American chinchilla is a notable exception. In the Australian region some of the kangaroos yield useful furs, and in this region and in South America the opossum is taken. The skins of several animals in warmer countries, with coarser hair, are useful for purposes other than clothing; as, for example, leopard, lion, and tiger skins for rugs.

The distribution of birds whose feathers form important articles of commerce is different. The Holarctic region is poor in them, except for a few such birds as the eider-duck. The Mediterranean region is again poor. But the Oriental region and the southern continents are rich, especially the tropical parts with their brightly coloured birds; there are also the ostrich in Africa and adjacent parts of Asia, and the South American rhea.

CHAPTER VII

MINING AND MANUFACTURES

Distribution of Minerals. Considerations affecting Distribution of great Industries.

It is impossible to lay down any very definite laws as to the physical conditions under which metals and minerals do or do not occur. Nor does it follow that because rocks of a certain geological age bear certain minerals in one country, they will do so elsewhere. We associate carboniferous rocks with coal, but in New Zealand they yield none; the coal there comes from younger rocks. The distribution of minerals, considered commercially, involves several questions. Speaking broadly, they belong to the older rocks, and where such rocks are folded and denuded so as to be exposed at the surface, there mining is likely to begin. Very deep mining is a later development. Folding and exposure by denudation suggests mountainous or hilly country. The harder rocks are, broadly speaking, less productive of minerals than the softer, and the main range of a mountain system less so than its flanking ranges. If, then, the mineral wealth of a country usually lies in or near its hills or mountains, that rules out our lowland regions as productive mineral regions, except in case of interruption of the lowlands by mountains or hills, such as the Urals in Russia. This would leave the main yield of minerals to the marginal lands and highlands, and this is broadly true (compare Fig. 10).

The great productive mineral lands are the United States first of all, with a remarkable variety and richness of minerals; South Africa, celebrated only for gold and diamonds; and Australia, possessing a greater variety. With the United States Alaska should be included, and Canada and Mexico associated. The mineral resources of Canada are in great part undeveloped. In South America the countries especially productive of minerals (notably copper and silver) are Chile, Peru, and Bolivia. In Europe the chief countries with a miscellaneous production of minerals are Russia (Caucasian region, Urals, South Russia, &c.), Germany, Spain, France, and Austria-Hungary; Britain with its coal and Sweden with its iron rank high mainly on the strength of these single products. The Asiatic countries do not rank high, relatively and generally, in mineral production.

When minerals are discovered, such questions as these have to be answered: Is the deposit so placed as to be easy or difficult to extract? Are fuel or water-power, and water for other purposes, to be had? Are there good means of transport? Is labour to be had locally;

or again, will immigrant workers be suited by the climate? and so forth. The extreme richness of a deposit may make it worth men's while to contend with very great difficulties in these connexions. Thus, we have already (chap. ii) noticed the arctic conditions in which the rich Yukon goldfields are worked. At the opposite extreme are the desert conditions of the Western Australian goldfields, such as Coolgardie, which draws its water-supply from a distance of 330 miles. The richness of the minerals must be great, and the industry well established, before such heavy works are undertaken; or, again, before mining is carried to such great depths as it is in some mining centres. In the latter case increase of temperature and rock-pressure,

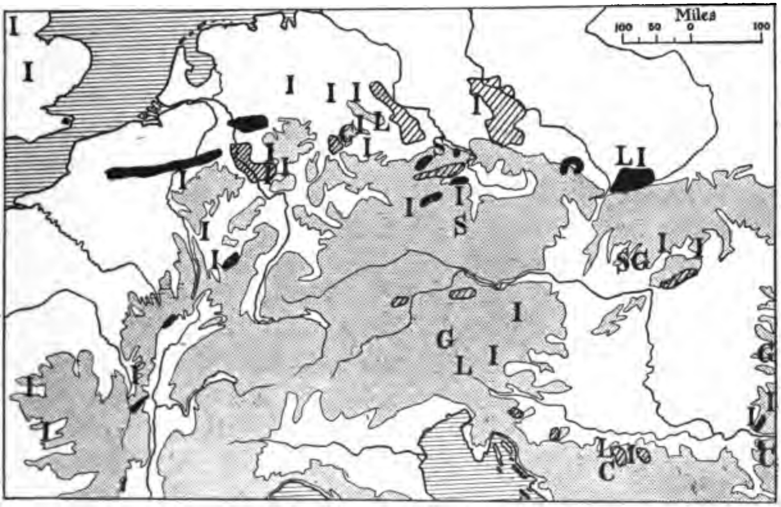

Fig. 10. The principal mineral fields of Central Europe, in relation to the relief of the land (over 1,000 ft. in elevation, shaded with fine dots). C = Copper; G = Gold; I = Iron; L = Lead; S = Silver. Coal-fields shown in black, lignite-fields shaded with sloping lines.
Further details as to the minerals will be found in Fig. 31.

and consequently difficulties connected with ventilation and the safety of the mines, have to be met. Temperature may increase at the rate of a degree (Fahrenheit) for 50, 100, or even 200 feet. Starting from a surface temperature of 50°, the middle rate would give a temperature of 100° at 5,000 feet depth; but some mining is done at higher temperatures than this. Nevertheless, we find mines carried to a depth of 4,000, 5,000 or even more feet in the old-established copper-fields of Michigan; 4,000 feet in the Transvaal gold region, and similar depths in Australia and elsewhere. In England and Belgium, where coal is a vital factor in industry and commerce, we find it mined at depths between 3,000 and 4,000 feet, and it becomes worth while to explore for it by deep borings in new fields, as in Kent.

Political considerations sometimes make the working of minerals difficult or impossible. Some nations have not learnt to develop the minerals in their lands and establish trade in them, but at the same time foreigners are prevented from doing so. China is an example. It is believed to be richer in coal than any other country; its fields include one of 30,000 square miles' area in the south of Shansi, where the coal-beds crop out on hill-sides and can be worked easily. Iron, copper, tin, antimony, and quicksilver are among other minerals. The Chinese mine crudely for their own supply, but the regulations under which foreigners have been allowed to work mines have created difficulties. Morocco is an extreme instance; of the minerals here, beyond a general idea of richness in gold, iron, antimony, and lead, little is known, owing to difficulties of dealing with the Government and the people.

Gold. The comparative poverty of Europe in gold is noteworthy. The same, judging by production, might be said of Asia; but in Tibet and other parts mineral wealth is wholly or practically undeveloped. The following are the chief producing countries: South Africa, the United States (with Alaska), Australasia, Russia (chiefly Asiatic), Mexico, India, and Canada. Of the totals from these lands, the African produce over one-third, the United States over one-fifth, and the Australian one-sixth. There are considerable fluctuations in some cases. The American, the Mexican, and (except during the years of the Boer War) the African output has generally increased; the Russian keeps pretty steady; the Australasian, and especially the Canadian, has in some recent years shown marked decrease. The States of the plateau region in America, in addition to Alaska, are rich in gold—Colorado, California, Nevada, South Dakota, Utah, Montana, and Arizona. All the Australian States and New Zealand produce gold; roughly, half of the Australian production is from Western Australia.

Silver. The North American plateau region, in Mexico and the United States (Nevada, Colorado, Montana, Utah, Idaho, &c.), supply over two-thirds of the world's production of silver. Australia, Canada, Peru, Bolivia, and Chile, with Japan, are important sources of supply. European countries, notably Germany, Spain, and Austria, produce silver also, but only to the extent of a tenth of the world's production. Silver is commonly associated with other metals, notably lead and copper. The United States and Spain yield *lead* largely.

Copper. The United States again leads, with more than three-fifths of the world's production. Again we find the plateau region (chiefly in Arizona and Montana, with Mexico) rich in the metal; but there is also a copper district in Michigan, near Lake Superior, extending into Canada. Mexico yields less than a twelfth of the world's production, and still smaller proportions come from Spain and Portugal, Japan, Australia, and Chile. The metal, however, is widely distributed.

Tin, on the other hand, is rather local in distribution and production. The Straits Settlements, with the islands of Banka and Billiton, supply the greater proportion. Bolivia and Australia provide a considerable share ; the ancient source of supply in Cornwall is still drawn upon.

Precious Stones are in great part products of hot or warm regions. South African mines stand practically alone as the source of diamonds, though Brazil also has mines. Burma, Ceylon, and Siam form a distinct gem-region, yielding rubies and sapphires. Colombia is noted for emeralds. In the United States and Australia precious stones are of minor value, and the only European gems of first-rate importance are the opals of Hungary.

Zinc is an important mineral product of Germany, Belgium, the United States and elsewhere ; *quicksilver* of Spain, Italy and Austria, California, Peru, &c. The rare and valuable *platinum* comes largely from the Urals. *Nickel* and *cobalt* are found in Ontario, and also in New Caledonia. The remarkably light metal aluminium is produced from *bauxite,* which is widely distributed, and *cryolite* is used in the process ; this last has been mentioned (chap. ii) as a product of Greenland. *Salt,* being obtainable both in the form of rock-salt and from underground salt waters or sea-water, is widely produced for local consumption, and no large proportion enters into international commerce. Among the various other minor minerals there are some few of which the distribution is closely related to climatic conditions. Thus *borax* is obtained (among other sources) from the saline efflorescence of lakes or marshes in the American desert or semi-desert regions, the Mohave desert in North America and that of Atacama in the south ; it also occurs in similar districts of Central Asia. Certain manures are obtained under similar conditions, such as the *nitrate* of soda from the dry districts of Chile and Peru.

Petroleum or rock oil is produced mainly in the United States and in the Russian oilfields of the Caucasus district, to the extent respectively of about three-fifths and one-fifth of the world's supply. The use of the various petroleum products has been greatly widened in recent years. They not only provide the bulk of illuminating oils, but also supply the fuel for internal combustion engines—that type of engine which has recently been so wonderfully improved and so largely adapted to motor vehicles, boats, ships, and aeroplanes, &c. Oil fuel is also used for firing steam engines, and the use of petroleum in lubricants has increased. For these reasons oil-fields have been opened up elsewhere than in the United States and Russia, as in Canada (Alberta, &c.), Trinidad, Galicia and Romania, Burma, Java, Sumatra and Borneo. The United States produce oil from several fields, chief among which are the California, the Kansas and Oklahoma, Texas and Louisiana, Ohio, Indiana and Illinois and Appalachian (Pennsylvania, &c.) fields. The Appalachian was the first to be developed, as might be expected from its position in the east of the States, where early commercial development took place. Asphalt is a product of petroleum under exposure to the air. It is worked in the so-called pitch lake of Trinidad, in Cuba and elsewhere ; a valuable asphaltic limestone is obtained in the Val de Travers, Switzerland. Natural gas, which frequently accompanies petroleum, is put to both domestic and industrial use.

Paraffin is produced chiefly from the rocks known as oil-shales, in Central Scotland, in New South Wales, &c. Ozokerite, a mineral wax used in candle-making, is a product of the Carpathian mountains (Galicia).

Coal and Iron. The countries which lead in the production of coal and in the iron industry are those which lead in manufacturing industries generally, so that the geography of coal and iron may be taken as an introduction to that of the great manufactures.

Coal. Omitting China, where the production cannot be estimated, and a few other countries where coal is raised in such small quantities as to be of no commercial importance, it is found that about 85 per cent. of the world's production is mined in three countries—the United States, the United Kingdom, and Germany. The United States' production approaches two-fifths of the world's total; that of the United Kingdom three-tenths. Germany raises less than a fifth. Then, with proportions ranging from four down to one per cent. or less, follow Austria-Hungary, France, Belgium, Russia, Japan, India, Canada, Australasia (chiefly New South Wales). There is some small production in the Transvaal and elsewhere in South Africa, in most European countries, in Sumatra, Mexico, and Peru. Coal also occurs elsewhere where it is worked little or not at all, so that it is widely distributed; and this distribution as marked on a map appears rather deceptive unless the very unequal distribution of production is kept in mind.

The areas of chief production in the United States are in a north-eastern group extending from Pennsylvania and Western Virginia westward to Illinois, and in

Alabama. But the richest coalfields are probably in the plateau region of the west—Colorado, &c. In England and Wales the chief fields are in South Wales, Lancashire and Yorkshire, Durham and Northumberland, Derbyshire and Nottinghamshire, and Staffordshire; and in Scotland in the Clyde-Forth area. In Germany the chief fields are the Ruhr basin and neighbouring fields; the Saar field; the Silesian field, centring on Beuthen; and the Saxon (Zwickau).

Whereas the United Kingdom exports more than a third of its coal (by value), the United States exports hardly a fourteenth part. Germany exports, but also imports from Britain, as the German fields lie far inland, whereas there is practically direct sea transit between some of the British fields and the German seaboard. As bearing upon the export trade from Great Britain, moreover, it is to be observed that coal differs greatly in quality and utility, and, particularly, as regards utility for certain purposes. Thus a coal largely exported from South Wales is particularly suitable for use in the furnaces of steamships, &c. This steam coal is of the nature of anthracite, which is the class of coal containing the greatest proportion of pure carbon, gives great heat with little flame and no smoke, and, as it does not light easily, is used for such special purposes as blast furnace work requiring high temperatures. The South Wales steam coal, however, burns more easily and with more flame than true anthracite. Below coals with the extreme proportion of carbon are ranked the bituminous coals, which include those most useful for general purposes; and below these again, with the smallest proportion of carbon, lignite. This last is not familiar in England, but is mined in several European countries, especially in Germany, while twice as much lignite as true coal is raised in Austria-Hungary. Lignite generally belongs to a younger geological formation than true coal (though not always): it is usually brown and may retain something of the character of the wood from which it has been formed; it burns with much smoke and little heat. On the other hand, some lignites are not easily distinguished from true coal and are almost equally valuable; this applies, for example, to some of the coals of the western plateau region in the United States, the bulk of which are lignites.

The exhaustion of coal-supplies is a matter frequently discussed and of prime importance to Great Britain, whose industrial commerce is so closely associated with her wealth in coal. An estimate based on the rate of coal-production at the beginning of this century foretold the exhaustion of the British coalfields during the next century, together with those of France, Bohemia, and Saxony; on the other hand, the Alsatian, Belgian, and Westphalian fields were estimated to last from six to eight hundred years.

Iron is so widely distributed that ores containing less than 25 per cent. of the metal are hardly mined at all, and an ore must be very rich indeed if it is mined, as North Swedish ores are, under comparatively difficult conditions as to transport, &c. (chap. ii). Britain has excellent iron ores in the Cleveland district of Yorkshire, in Northamptonshire, Lincolnshire, Cumberland and North Lancashire (Furness), Staffordshire, and Scotland. Large quantities of ore, however, must be imported, especially from Spain and Sweden. The position of the ironworks is on or near the coalfields (p. 94), thus the Cleveland district have the Durham fields at hand, and even the South Welsh fields, where iron ore is not abundant, have ironworks. Sweden, which besides the northern mines has others north-west of Stockholm, has practically no coal (though plenty of wood) for smelting the ore. Spain exports nine-tenths of the product of rich mines in the north and south. There is a valuable field in Luxemburg and Lorraine, in which both Germany and France have a share; but Germany has to import largely. Russia has iron mines at Krivoi Rog in the south near the Donets coalfield, in the Urals and elsewhere. In the United States by far the richest field is about Lake Superior, in Minnesota, Michigan, and Wisconsin. Other districts are in the south, from Texas to Georgia (especially Alabama); in the north from Iowa to Massachusetts, and the western marginal regions. Of the world's production of iron ore the United States supplies roughly two-fifths, Germany one-fifth, Britain one-eighth. Of pig-iron the United States, where the vast manufactures are practically supported by the home supply of ore and metal, produces a slightly larger proportion of the world's supply, Germany considerably over one-fifth, and Britain one-sixth. The three countries together, thus making fully four-fifths of the world's pig-iron, make an even larger proportion of its steel.

MANUFACTURES.

Considerations affecting the Distribution of great Industries.

The three leading reasons for the geographical position of a manufacturing centre or district are usually set down as—ease of obtaining raw material, supply of power (whether fuel for machines or water-power), and easy accessibility to markets for the finished product. The easiest way of obtaining raw material would be to establish the manufacture at the source of it. But this arrangement is rather the exception than the rule in the case of the greater industries. For example, neither Lancashire nor any other great cotton-manufacturing region in Europe is itself, or is anywhere near, a region supplying the raw material. Modern facilities of transport, however, especially ocean-transport, have made it possible for manufacturing centres to draw upon distant sources of supply for raw material, and to be established at or near the source of power, coal or water. The use of coal as a source of power is a development of a comparatively modern period. But many industries in an old industrial country like England were already long established where we now find them. In these cases the presence of coal was obviously not a first cause of the establishment of an industry in a particular locality, but it strengthened its establishment there, and sometimes drew it away from other localities. An earlier source of power was water. Water-power is not so markedly local in distribution as coal, so it is not to the same extent a cause of the concentration of industries in thickly-populated districts. When it is stated of a manufacturing town or district that good water-power is available, it may be assumed that there is a river falling or flowing in sufficient and steady volume and force to drive machines. Thus the European countries making the greatest use of water-power in proportion to their totals of mechanical power used in industries are Switzerland, Norway, and Sweden, mountainous lands with little or no coal but many rapid rivers. This suggests that we shall not find water-power used (at least on any considerable scale) where rivers flow sluggishly over flat country, or where they run very low in dry seasons. On the other hand, it is possible with the modern development of electricity to distribute power generated by water. Waterfalls drive the machinery generating the electricity, which is conveyed through cables to the points where it is needed to drive manufacturing machinery, railway engines or tramway cars, or to be used in processes of reducing metals (aluminium, for instance, the factories for which are generally established where water-power is available), or in lighting. Sometimes it is worth conveying electricity for great distances to important centres of population and industry. Thus Winnipeg, in the interior lowland of Canada, is supplied from a distant source, and there are instances in the United States of the conveyance of electricity over a hundred or even two hundred miles or more from the source of its generation by water-power. Lighting by this method may be indirectly of great commercial importance. Thus, by its means it is possible in the north, remote from coal supplies, to carry on industries and commerce through the long hours of darkness in winter.

It has been said above that the presence and use of coal as a source of mechanical power may have strengthened an industry previously existing in a certain locality. In that case it is necessary to go back in the history of the industry to find first causes for its establishment in that locality. For instance, the establishment of woollen and cloth industries in the West Riding of Yorkshire may be first connected with the extensive moorland pastures for sheep there ; they were already important in the eighteenth century. But there was plenty of pasture elsewhere in Britain, and we find these same industries flourishing at an earlier date along the Cotswolds and at other places in the west and south, and in Norfolk—localities which they have partly or wholly deserted since the use of coal and introduction of machinery strengthened the Yorkshire manufactures. The old processes of bleaching used to require open grassland on which the cloth could be laid out; linen is still so treated. Pure streams were necessary, and some waters gained an early fame as specially suitable to textile industries. Such were those of the Wupper, in the valley of which is now the great German textile centre of Elberfeld-Barmen. The Irish linen district of Ulster and the Lancashire manufacturing district (where wool was manufactured before cotton), possessed distinct physical advantages for these industries. Climatic conditions were (and are) also important; thus the climate of Ulster is said to be particularly good for the bleaching process, and cotton-spinning requires a moist climate, which Lancashire provides, for in a dry atmosphere the yarn becomes brittle and therefore difficult to work.

The iron industry, again, provides an illustration of the determination of the place of an industry by the presence of coal. Down to the eighteenth century there was an iron industry in Sussex, and local timber was used as fuel for smelting, to the destruction of the forests. Industries involving the use of iron are of course very widely distributed; for instance, we find in districts devoted mainly to a particular industry the manufacture of machinery required for that industry; in agricultural centres the manufacture of agricultural implements and machinery, and so on. The manufacture of iron and steel goods has many branches, and in one centre or another there may be a tendency to specialize in one branch or another, independently of any other local industry. Thus Sheffield has been famous for cutlery and tools from early times, and though heavier goods, such as armour-plate, have been added to its products, its industry remains chiefly identified with cutlery and tools in the minds of most people. Long before the uses of coal and steam were thought of, that industry was established, and the original geographical reasons for this have become obscured by others. At Sheffield the earliest metal-workers found ironstone near the surface. Forests were at hand for fuel. Several small streams, feeders of the river Don, ran down narrow valleys. On the high ridges above these the primitive smelting fires could be exposed to the blast of prevailing winds. The power of the streams could be used to turn grindstones. The position of Sheffield is striking, lying as it does within touch of the great textile district of the West Riding of Yorkshire, yet having no share in that industry. Solingen, situated high above the Wupper valley, and celebrated for centuries for its cutlery and tools, is a German parallel to Sheffield.

We have seen (pp. 90, 91) that both Britain and Germany import iron ores, and in the United States the ores of the Lake Superior and other districts are largely conveyed to the Pittsburg district, where coal, petroleum, and natural gas are abundant, and there are produced large proportions of the pig-iron (about a quarter), steel (nearly half), and iron and steel goods made in the whole country. The general rule is that iron ore is conveyed for working to the locality of coal, not coal to the locality of ore, where the two do not occur in sufficient quantities together. Modern transport can thus make good the failure of a local ore supply. When in an industrial district both local iron and local coal fail, as ultimately they must, it remains to be seen whether the industry can be maintained in its place by the importation of both.

When particular industries are thus attracted to the locality of a coalfield, the natural tendency is towards a close crowding of population, and we connect the idea of any important industrial district with a number of large towns close together. But sometimes important manufacturing industries may not be concentrated in towns entirely. For instance, the Irish shirt-making industry, which centres on Londonderry, is still carried on to a considerable extent in the peasants' cottages over a wide extent of country. A more striking and rare example is the cotton manufacture which has sprung up in the cotton-growing districts of the United States (North Carolina, South Carolina, &c.). Here is an industry whose position is not determined by that of a coalfield, but by the source of the raw material—the cotton-fields—and by the existence of better water-power than is obtainable in the older north-eastern cotton-manufacturing district. The natural geographical result is that this manufacture, in the South-eastern States, is not concentrated in a number of large towns close together. The towns are few, scattered, and small, but here and there over a wide area cotton-mills stand, generally in small groups, among the cotton-fields.

Just as a small industry serving local needs probably owes its creation, independently of any geographical cause, to the ability of one man or a group of a few men in satisfying those needs, so there are some great industries, serving wider markets, established where there is no special geographical influence upon them, and traceable to the skill of a few. In America instances are not uncommon: the huge shoemaking industry of Lynn, Massachusetts, is traced to the settlement there of an immigrant British shoemaker in the seventeenth century. In older industrial lands such origin may be impossible to trace, though personal influence on development, such as that exercised by inventors of machinery, is obvious.

But once a large body of expert workers in a particular industry has been collected in a particular place it is not easily dispersed. There is no strong geographical reason now, in respect of either raw material or fuel, why the potteries of Staffordshire (Stoke-upon-Trent) should be situated exactly where they are. The industry has grown up, largely owing to personal genius like that of the Wedgwoods and other famous manufacturers, till it has reached the stage of maintaining itself in its place while drawing supplies of both raw material and fuel from elsewhere. Local clays originally sufficed for the works, and at an early stage a well-known pottery was produced which was glazed by the use of common salt. In this connexion the presence of the old-established salt works in Cheshire, close at hand, is of geographical interest.

We have made various comparisons and distinctions between Great Britain, Germany, and the United States in respect of industrial conditions. But if the matter is viewed regionally, the comparisons are in some cases altered and the distinctions are less marked. If we compare the western marginal lands of Europe with the eastern marginal lands of North America, we find that these lands are closely similar in the production of coal and iron, and in the distribution and activity of industry, but the European region is the more productive, and its industries are greater. We speak of Great Britain having to import iron ore from Sweden and Spain, while the United States has its own supply; but it must not be forgotten that the distance from the Superior iron-field to the Pittsburg coalfield is not very much shorter than that from Spain or Sweden to England.

There is both similarity and contrast between the climate of the principal European and North American industrial areas. Those of Britain and Germany (to which may be added those of North-eastern France and the Low Countries) lie on either side of the mean annual isotherm of 50° Fahrenheit, with the balance towards the north (cooler side). In America the same line passes through the industrial area, but the balance is strongly towards the south, and (leaving out of account the Carolina cotton manufacture above referred to) the isotherm of 60° is not far from the southern boundary of the area. The January and July isotherms point to the greater extremes to which the American region is subjected. The January isotherm of 40° roughly bounds both European and American areas on the south. Only the extreme inland, if any, part of the European area falls within the limit of 32° average temperature in January, while in America, where the winter temperature decreases rapidly from south to north, the northern part of the industrial area may have an average in January of 5° to 10° below this. The European area lies all north of the July isotherm of 70°; the American lies all south of it. Still there is no very strong difference in temperature between the two regions at any point.

CHAPTER VIII

TRANSPORT

Navigation. *Rivers.* Navigation is an early instinct of man. From the rivers primitive man can supply himself with fish. Some peoples before the dawn of history lived (as some still live) in dwellings built above the waters of lakes, where they were protected from danger on land. But to reach land they needed some form of boat. Rivers and lakes offered (as in some lands they still offer) the easiest if not the only way of passing through forested or swampy country. The original seats of political power, again, would appear to have been in great river-valleys, and within the limits of the territory of a valley power the river forms the natural highway of communication. We thus find a very early seat of civilization in Egypt, the strip of land annually fertilized by the overflowing of the Lower Nile. Another early civilization is that of Babylonia and Assyria in the lower valleys of the Tigris and Euphrates.

It may be said broadly that the tendency of countries thus politically organized in early stages of the world's history was to be self-supporting in respect of such commodities—articles of food and so forth—as now make up the bulk of international commerce. If trading took place between such peoples at all by overland routes, it was at a late stage in their development, and was concerned mainly with articles of small bulk and high value —articles of luxury rather than of necessity. Traffic in bulky food-stuffs or raw materials for manufactures does not appear. Land traffic was limited in respect of bulk, because men or pack animals had to carry the goods. Also long-distance commerce in its early stages of development, whether by land or sea, has always been liable to attack, robbery or piracy.

In some lands it was a natural step from the navigation of rivers to that of the sea. In others navigation had its origin on the sea, as with the island-dwellers of the Pacific Ocean, or the Eskimos of the Arctic. The development of navigation, then, is not only early but practically universal. The only lands where it does not develop at all would naturally be arid tracts, devoid of rivers, fringed by a dangerous, unsheltered sea, as in South-western Africa. The evolution of boat-construction may be traced from the floating log or reeds tied or woven together, supporting at best a man and a bundle, to the hollowed log or 'dug-out'; to the boat of bark or skin fastened upon a frame; to the raft or boat constructed of a number of pieces of wood tied together; to the decked raft, with enclosed sides; finally to the wooden vessel of planks nailed to a framework. The reed is the early boat-building material of treeless lands, as on the Nile, the lagoons of Seistan (Persia), and elsewhere. Boats woven of osiers like a basket and covered with skins appear in various waters, as on the Euphrates, where they are of very early origin. Similar materials compelled similar methods of construction by the natives of lands far distant one from another, and independently of any communication between them.

Inland Navigation: Relations with Railways. In the early stages of the commercial development of a country its navigable rivers are of the first importance. At a later stage they may share that importance with railways, or lose it to them. We may illustrate these stages.

In the *Amazon* basin communications are practically confined to the rivers. The main river itself is navigable for 2,300 miles to Iquitos by large ocean steamers, and beyond that distance for nearly 500 miles by ships drawing 14 feet. A little above again occur heavy rapids (the Pongo de Manseriche), and rapids at certain points are characteristic of most of the great tributaries, generally in their upper or middle parts, sometimes in their lower courses. Excepting for the avoidance of these rapids by overland portage, all traffic is waterborne, and all settlement is riverside. There are no railways,

UNIV. OF CALIFORNIA

though one is projected up the Madeira from San Antonio, above which there is a succession of rapids.

The *Congo* (Fig. 11) illustrates the use of railways as links where river navigation is broken by falls or rapids. Ocean vessels sail up the river to Matadi. Above this are cataracts, such as characterize other great African rivers in their lower courses, and form a physical reason for the very slow opening up of Africa by exploration and trading, since men could not easily get up the rivers into the interior. A railway (260 miles) from Matadi to Stanley Pool surmounts the cataract reaches; thence there are nearly 1,000 miles of navigation to Stanley Falls. Another railway (80 miles) avoids the rapids hence upward to Ponthierville; another 300 miles of navigation follows, then a railway past rapids above Nyangwe gives access to the navigation on the Upper Lualaba. The *Nile* valley exhibits a further, but still

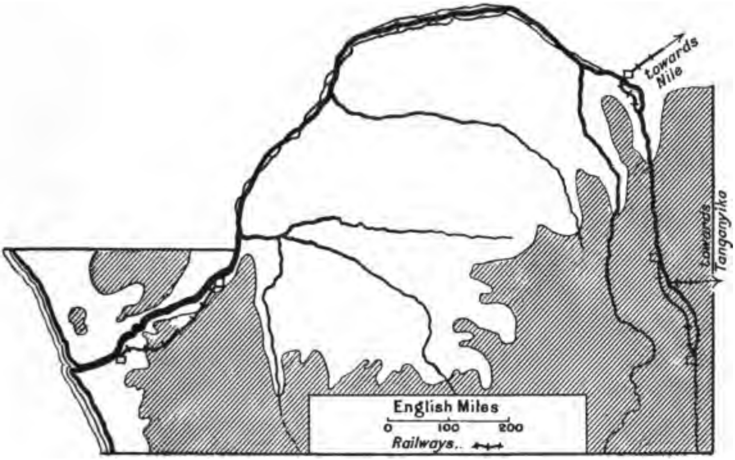

Fig. 11. The Congo Valley and its Railways. (Highlands shaded.)

not complete, stage in railway development. The lower railway system gives access from the Mediterranean coast to Shellal, nearly 700 miles. The upper runs from Wadi Halfa far into the Anglo-Egyptian Sudan. But the river still provides the link between Shellal and Wadi Halfa.

A good example of railways acting merely as feeders to a water-highway is found in Colombia, South America (Fig. 12). The majority of the railways in this country are short lines connecting river ports on the Magdalena with trading centres away from the river. A railway also connects points above and below the Honda rapids which interrupt the navigable highway.

Under fully developed commercial conditions a river keeps its paramount importance only so far as it admits large sea-going vessels to inland ports. But even if the river loses importance relatively, the valley, as a highway of communication, may keep it. Thus the Rhine has railways on or near both banks practically throughout its length from Lake Constance downward.

Canals have either to keep to a fixed level (in which case they have to follow closely the contour of the land, as illustrated in Fig. 13), or if the level is changed there must be a lock or locks. Locks are also built on rivers where the current is by nature too rapid for navigation, or where falls occur. The course of rivers and canals is usually more or less winding; the wash of a vessel moving too fast is liable to injure their banks, and the passage of locks causes delay. On all these accounts canal and river navigation is slow. But for bulky commodities such as coal, ore, and various raw materials the cheapness of water transport may be more important than its slow speed as contrasted with railways. In England the inland waterways (except in special instances) have not been developed to keep pace with the needs of modern commerce. But the systems in Central Europe (Fig. 14) and France, including great rivers like the Rhine, Elbe, Oder, Vistula, Danube, Seine, Loire and others, are still of importance, and in Germany, Holland, Belgium, and France there are also canals which maintain heavy traffic. Similarly in North America some

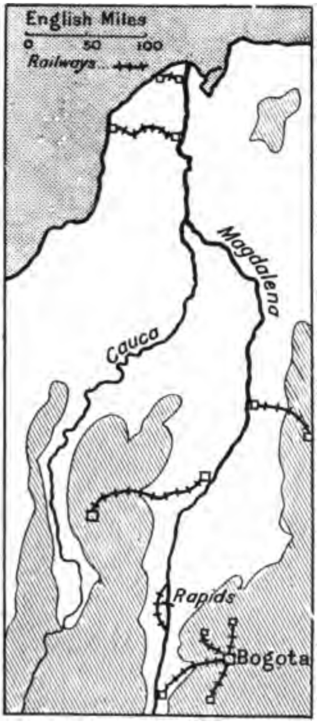

Fig. 12. The Magdalena Valley (Colombia, South America) and its Railways. (Highlands shaded.)

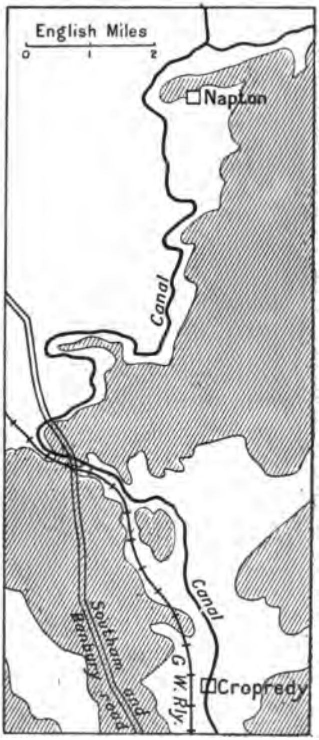

Fig. 13. Part of the Oxford Canal, north of Banbury, showing how closely it follows the contour of the land (over 400 ft. elevation shaded), in contrast with road and railway.

canals and rivers still form commercial highways. The Mississippi waterways, and the Hudson River and Erie Canal, connecting New York with the Great Lakes, are examples.

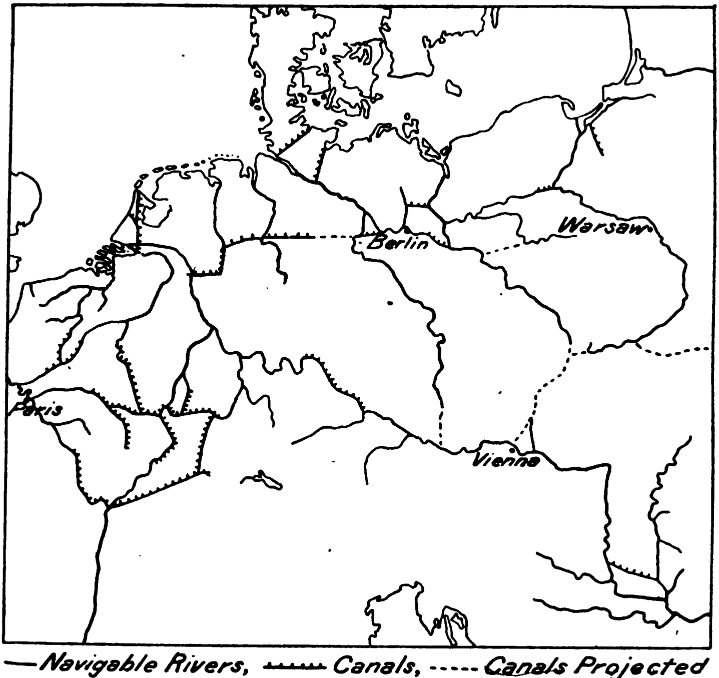

Fig. 14. The Navigable Waterways of Central Europe.

The Great Lakes themselves—Superior, Michigan, Huron, Erie, and Ontario (Fig. 15)—are of first-rate importance to the trade of both the United States and Canada, and stand alone among systems of inland navigation. Locks surmount the fall at Sault Sainte Marie (called the Soo), between Lakes Superior and Huron. From the time when this route began to be considerably

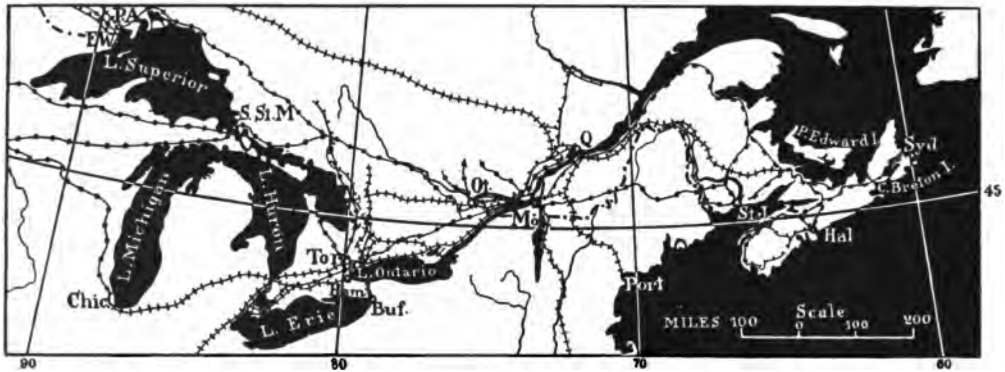

Fig. 15. The Great Lakes and St. Lawrence, with connecting Railway Routes.

developed (about 1855–60), the tonnage of cargoes passing this point increased roughly a thousandfold in half a century. From Lake Michigan there is canal connexion with the Mississippi, from Lake Erie with the Hudson, and between Lakes Erie and Ontario to overcome the Niagara falls. The St. Lawrence is navigable below Lake Ontario. There is also a direct Canadian waterway between Georgian Bay (Lake Huron) and Lake Ontario, and with the view of still further shortening the water route to the interior, a connexion between Georgian Bay and the Ottawa River has been planned. Canadian wheat is conyeyed by steamers from Fort William and Port Arthur on Lake Superior; American grain mainly from Duluth and Chicago to Buffalo; iron ore is conveyed from ports on Lakes Superior and Michigan to those of Lake Erie; there is also a large coal traffic. The largest of the Great Lakes freight steamers carry 13,000 tons or more of iron ore or coal.

Ocean Drainage Basins. In connexion with the commercial importance of rivers and the fact that the greatest commercial countries occupy Atlantic marginal lands, the large proportion of the world's river-basins which belong to the Atlantic drainage area should be remembered. Over a third of the total belongs to this ocean, whereas roughly a seventh only belongs to the Pacific, and an eighth to the Indian Ocean, leaving the remainder to the Arctic and inland drainage basins.

Sea-Traffic: *History of Atlantic Expansion.* The geographical extension of oversea trade may be understood from a short reference to history. The first stage of Atlantic sea-traffic is found in the Eastern Mediterranean. In very early times the Egyptians had some traffic in that sea, and about 2,500 years before Christ a centre of early civilization, strongly established in the

Aegean (Crete, &c.), gradually extended its trade over the whole area from Sicily to the Levant. Probably about the twelfth century B.C., when this power had weakened, the Phoenicians of Tyre entered the Mediterranean field of commerce. They extended their trading settlements to the Strait of Gibraltar and beyond it. They are said to have circumnavigated Africa. They kept the more distant sources of their wealth secret from other Mediterranean trading peoples, but it may be that extension of Atlantic sea-commerce was kept back for centuries by the decline of the Phoenician sea power. Phoenician colonies remained strong after their power had weakened in its original home, and one of these, Carthage in North Africa (on the present Gulf of Tunis) came into conflict with the empire-building Romans and by them was destroyed in 146 B.C. At this period Corinth and Athens, great Grecian trading centres, came also under Roman rule. In spite of such changes Mediterranean sea-traffic continued on much the same lines as before. But the Romans had their vast land empire to maintain and extend. Their strength was in the first instance military, not naval; they paid much attention to the development of land routes, and laid out a great system of roads. Britain was the limit of their expansion over Atlantic waters.

But during the centuries which covered and followed the break-up of the Roman Empire, with their succession of wars in Western Europe, the pursuit of commerce was, broadly speaking, safer by water than on land. We now find strong towns building up trade for themselves, or banding themselves together to do so. Thus Venice, when Italy was subject to invasion from the north, was established on the safe lagoon islands at the head of the Adriatic, and extended her power and commerce over the Eastern Mediterranean and beyond, between the ninth and sixteenth centuries. Similarly, the confederation of towns known as the Hanseatic League had its origin in the ports of Lübeck and Hamburg in the thirteenth century, for the protection and development of commerce. Its influence was gradually extended over cities along the North Sea coast from Amsterdam to Bergen, and in the Baltic (Riga, Visby on the island of Gotland, &c.). Moreover, illustrating the importance of rivers to commerce, the league extended its connexions far up the great waterways of Central Europe, from Cologne on the Rhine to Cracow on the Vistula.

Thus far we trace steps in the development of sea-traffic from the Eastern Mediterranean to the whole of that sea, and from it to the North Sea and the Baltic. The next step is towards the ocean itself. In the thirteenth and fourteenth centuries the mariners' compass was coming into use, and the following century saw the gradual exploration of the Atlantic. At its close the ocean was crossed to America, the Cape of Good Hope was doubled, and the seaway to India was revealed. The Mediterranean route to the East lost its importance until the cutting of the Suez Canal; traffic with the East no longer had to be carried on under the difficulties of transhipment and portage from Mediterranean to Indian waters, or to be subject to attack from Moorish and Arab pirates. In 1519–22 Magellan's expedition found the route from the Atlantic to the Pacific by Magellan Straits, and the world was circumnavigated. Thus the Atlantic became the highway to other oceans. The development of commerce overseas was slow, and attended by frequent conflict between the leading exploring peoples, Portuguese and Spanish, French, Dutch, and British. But when the nineteenth century brought the development of the application of steam to machinery, and other inventions which worked such vast changes in industry and commerce, the geographical lines of commercial expansion overseas were already laid down.

Merchant Shipping. As sea-traffic developed so slowly, it was only in recent times that the size of the largest merchant ships very greatly increased. The Roman merchant ships in the Mediterranean would seem to have ranged up to 500 tons or more. At the time when the great period of oceanic exploration began, ships had been built of more than 1,000 tons, though Columbus crossed the Atlantic in one of only 230 tons. Steam brought great changes. The first steamer crossed the Atlantic in 1819. A little later the building of iron ships began ; steel was introduced about 1875, and has now practically superseded iron. About 1865–70 an equal tonnage of sailing ships and steamers were being built in the United Kingdom. From that time steamers began to increase largely in number and size, and sailing ships to decrease. In the five years 1890–4 240 sailing ships of over 100 tons were added each year on an average to the British register of shipping, and their average tonnage was 650. In the period 1905–9 only an average of 150 was added annually, and their average tonnage was little over the hundred. The annual average number of merchant steamers, however, increased from 500 to 650. Only about a quarter of the world's merchant shipping consists of sailing ships. But the internal combustion engine has been applied recently to large sailing ships for the purpose simply of driving them when working out of harbour, or during calms. Such ships may increase in numbers, and so may ships driven by internal combustion engines only. Apart from this, there are some important branches of trade in which sails still compete with steam on more or less equal terms. Thus on the Pacific coast of America sailing ships deal largely with such traffic as that in Californian wheat or South American nitrate; this coast has no large coalfields adjacent to its ports, from which steamers can be supplied.

Of the total tonnage of the world's merchant shipping the British Empire owns nearly nine-twentieths. A very large proportion of this belongs to Britain itself. Great Britain, an Atlantic island well provided with harbours, itself a great industrial country, and placed between those of Europe and North America, has the best position in the world for sea-traffic. Great Britain and Ireland build nearly two-thirds of the world's shipping. The United States owns more than an eighth, and Germany a tenth of the total tonnage; both countries we have seen to be rapidly advancing in industry, and both are also advancing as shipowners. Next after them stands Norway with nearly a twentieth of the total, a high proportion in consideration of the very small population of the country. It has not many large industries, and is almost wholly mountainous and inhospitable, neither fitted for much agriculture nor rich in minerals. But it has a coast deeply indented by fiords, protected almost throughout its length by islands, free of ice in winter in spite of its high northern latitude, and rich in fisheries. The Norwegians, therefore, have been a seafaring people from the earliest period of their history. Their own chief highways of communication are the sheltered fiords and 'leads' between the islands. They have plenty of natural harbours, have always been ready to venture from them overseas, and so now take a high place as carriers of the world's commerce. After Norway, as principal shipowning countries, follow France, Italy, and Japan.

Merchant steamers may be broadly divided between 'liners' carrying passengers and cargo between fixed ports, and 'tramps' plying wherever profitable cargoes are to be had. About 1890, steamers over 8,000 tons were few; in 1910 there were under various flags over 80 steamers exceeding 12,000 tons. A large ship carrying a certain weight of cargo is as cheap to construct as two smaller ships together carrying less, and the size of ships serving the greater lines of commerce is limited in the first instance by the depth of ports and dock accommodation. The larger the ship, the fewer the ports it is able to use.

Ports. For illustrations of the geographical position and character of great ports we shall continue to draw mainly upon the three great commercial countries, Great Britain, Germany, and the United States. In a list of the chief ports of Great Britain (according to the tonnage of shipping entering and leaving them), the first seven furnish examples from all coasts, west, south and east, and of close relationship with the chief coal-mining and industrial districts.

London, the first port of all, owes its rank as such and as the capital city to its position at the head of the Thames estuary, with its easy access across the North Sea to the mouths of the Scheldt, Rhine, and Elbe, and to the Baltic. Its imports largely exceed its exports in value, for London is rather a general mart than the special outlet for any large manufacturing district. Moreover, it has a great trade of the kind to which the French word *entrepôt*, meaning a storehouse, is applied. This trade is characteristic of British sea-traffic, and a natural result of the geographical position of the island and the pre-eminence of its mercantile marine. Goods are collected from all parts to be distributed or re-exported. For example, a shipload of an American commodity may be brought to an English port, and parts of it shipped on to continental ports; or again, some commodity from a continental port, destined (let us say) for a British colony, may be sent to an English port and re-shipped for its destination along with a cargo of English goods. London carries on as much of this *entrepôt* trade as the remainder of British ports together.

Of the other leading ports Liverpool and Birkenhead face each other across the estuary of the Mersey, the great gateway to the Lancashire industrial district, and, as regards overseas trade, especially to North America. Cardiff is identified with the South Welsh coalfield; the Tyne ports (Newcastle, North and South Shields) with that of Northumberland. Southampton serves no industrial district directly, but is the principal port on the south coast, and has one of the best natural harbours in the world. Hull, on the estuary of the Humber, is most closely related to the industrial district of the West Riding of Yorkshire; the estuary faces towards Northern Europe, and a vast trade with North Sea and Baltic ports converges upon it. Glasgow is on the Clyde estuary, the western seaway to and from the industrial district of Central Scotland.

Now if we take a second series of ports, they are found to group themselves with one of those named above: thus, Newport and Swansea with Cardiff; Middlesbrough, Blyth, and Sunderland with the Tyne ports; Grimsby with Hull; and Manchester, served by its ship-canal from the Mersey, with Liverpool-Birkenhead. Dover follows Southampton among the south-coast ports, and Leith is the chief eastern, as Glasgow is the western, port of Central Scotland.

Among German ports Hamburg, with Altona, on the Elbe, possesses the wide internal communications provided by that river and its connexions; it is the principal North Sea port for Berlin and the industrial districts of the centre and south. Bremen on the Weser serves the mining and manufacturing district of the Ruhr, to which it is of more importance than it would be if Germany held the mouth of the Rhine. As it is, much German trade passes through the Dutch port of Rotterdam on the estuary of that river, and the Belgian port of Antwerp on that of the Scheldt. Stettin takes the lead among Baltic ports; Lübeck, Danzig, and Rostock rank high; but the relative importance of the Baltic ports has decreased since the period when sea-traffic was confined to the narrow seas, and Hamburg and Bremen, opening directly to the North Sea and so to the Atlantic, have surpassed them. However, the Kaiser Wilhelm ship-canal, commonly called the Kiel Canal from the great naval port at its Baltic end, gives direct access from that sea (especially its German ports) to the North Sea, saving the long journey round the north of Denmark.

New York has something of the character of London in carrying on a much greater import than export trade. Its total trade is nearly half that of the whole of the States' ports. It is the nearest of these to the Great Lakes region, and carries on a heavy traffic with them by way of the Hudson—that river is the geographical cause of its pre-eminence—and the Erie Canal. Boston follows it, serving the great north-eastern industrial district; next come New Orleans and Galveston, exporting vast quantities of cotton and other products of the field, with relatively little in the way of manufactured articles. Philadelphia and Baltimore serve the industries of the middle eastern margin. San Francisco stands alone—one of the few natural harbours on the American Pacific coast, served by three transcontinental railway systems, and the outlet for the rich Californian valley.

Types of Ports (Figs. 16, 17). The river or estuarine type of harbour is clearly the most common among the great ports. London and Liverpool, Hamburg and Bremen, Antwerp and Rotterdam, Philadelphia and New Orleans are examples. The drowned valley type, a far better natural harbour, is exemplified in New York and San Francisco, narrow at the mouth, but broadening within, and thus perfectly sheltered by nature. Norway, with its coasts deeply indented by fiords and protected by islands, is well provided with natural harbours; the map (Fig. 18) illustrates a typical part of the coast. Some inlets form excellent harbours if shelter is artificially completed by means of a breakwater; Plymouth (the Tamar estuary) is an example, with its breakwater sheltering the entrance. Estuarine ports and lagoon ports (of which Venice is an example) are subject to silting and the formation of bars, and require continual dredging. A small exposed river-mouth like that of the Tyne has to have sheltering piers. Lastly, there is the wholly artificial type of harbour, formed entirely by building breakwaters, as at Dover, which is here illustrated in a plan showing the harbour as first built with eastern and western entrances. It has since been decided to close the western entrance, for the storms blowing 'up-channel' from the south-west made it dangerous.

The tendency to build larger and larger ships of recent

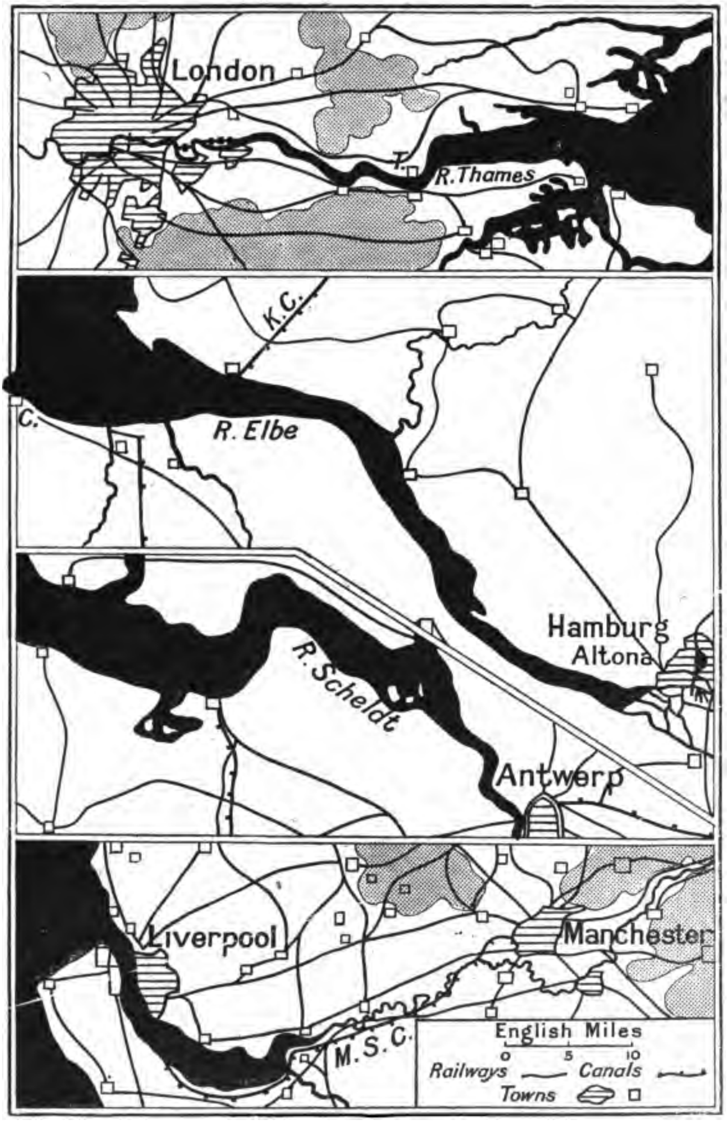

Fig. 16. Types of Ports.

(T. = Tilbury. K.C. = Kiel Canal. C. = Cuxhaven. M.S.C. = Manchester Ship-Canal. High ground shaded.)

years has to some degree caused commerce to concentrate upon a few great ports. In these, especially if they lie some considerable distance up estuaries, constant attention has to be paid to the clearing and deepening of the navigable channel, and to the provision of docks to receive the larger ships. Or, if that is impossible, the ports are extended, as it were, down the estuary to meet the ships. Thus London accommodates the largest vessels trading to it at Tilbury Docks, 25 miles below London Bridge, and it has been proposed to establish deep-water wharves at Canvey Island, some 12 miles below Tilbury on the Essex shore. Hamburg has its 'outport' at Cuxhaven, Stettin at Swinemünde, and so on. Apart from this consideration, the importance to commerce of a great seaway penetrating the land may be perhaps best illustrated by the fact that some ports rise to high rank though they are icebound in winter, and traffic may have to be diverted from them then. In the Baltic, for example, the Russian port of Riga (with its outport Ust-Dvinsk) is frozen for about a third of the year. The great waterway of the St. Lawrence in Canada, which admits vessels of 15,000 tons to Quebec and Montreal, is closed by ice from mid-December to April, and shipping is then transferred to Halifax (Nova Scotia) and other ice-free ports. These, however, being on the Atlantic sea-board, are accessible only by a much longer land journey than Montreal and Quebec to trade with the interior.

Sea Routes. The great oceanic routes of commerce may be thus summarized: (1) The North Atlantic, crossing between European and American ports; (2) the Suez route, by the Mediterranean Sea, Suez Canal, Red Sea, and Indian Ocean to East Africa, India, the East and Australasia; (3) the two Cape routes—that to the Cape

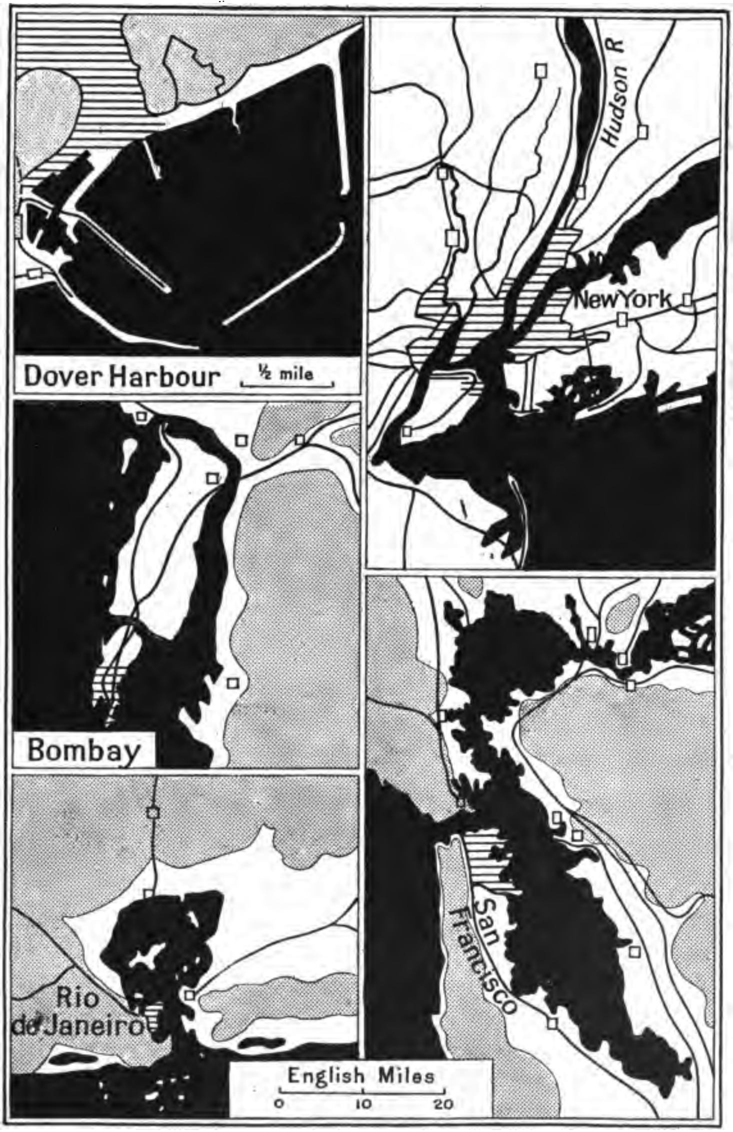

Fig. 17. Types of Ports. (High ground shaded.)

of Good Hope and round it to East African, Australasian, and other ports, and that by Cape Horn to Pacific ports. Ships make a long open-sea voyage on a course approximating to a 'great circle', subject, in the case of sailing-ships (and, in some lesser degree, of steamers) to modifications made so as to take advantage of favourable winds and currents, to avoid a course on which storms are prevalent, and so forth. A great circle is that in which a sphere is cut by a plane passing through its centre; thus, if the sphere is the earth, all meridians and the equator are examples of great circles. An arc of a great circle is the shortest line joining any two points on the sphere, and ships' courses are generally

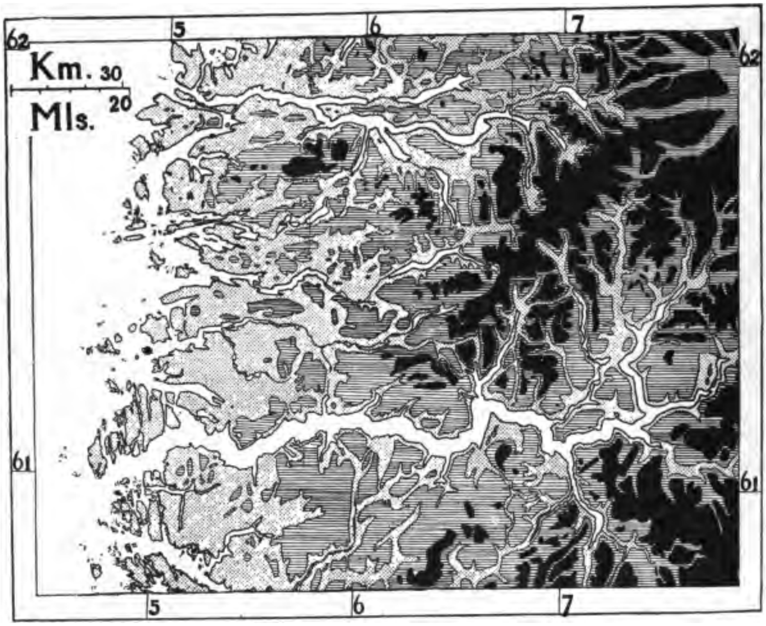

Fig. 18. Part of the Coast of Norway.

laid along chords of such arcs, with a slight change of course from time to time. In the North Atlantic there are recognized 'lanes' for steamers crossing in either direction. The risk of collision is thus reduced, and, further, sailing-ships can avoid the lanes.

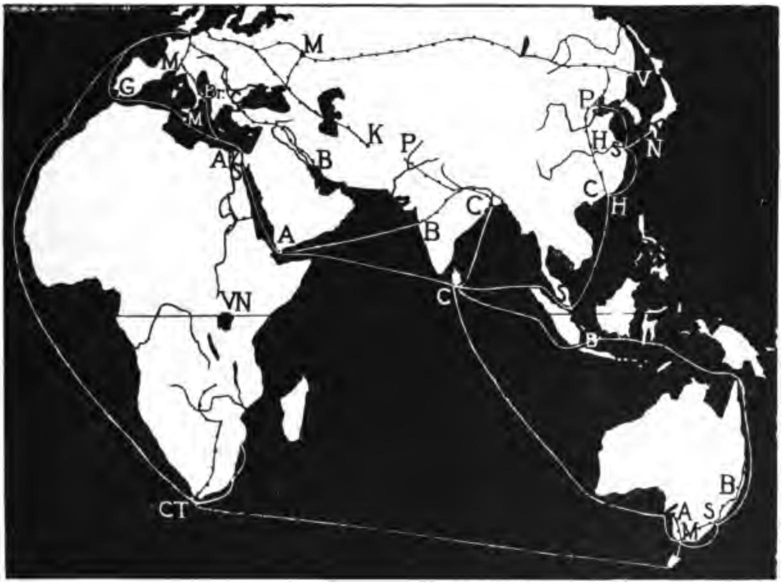

Fig. 19. Commercial Routes from Europe to India, Australia, and the Far East. The distances by way of the Suez Canal (S.) may be contrasted with those by way of Cape Town (C. T.).

Ship-Canals. The Suez Canal has vastly reduced the importance of the Cape of Good Hope route for steamer traffic. By the canal, distances to Eastern and Australian ports are greatly reduced, and on the route there are more coaling-stations than on the Cape route, so that steamers can carry smaller coal supplies and more cargo. This canal reduces the sailing distance from British ports to India by 4,000 miles or more, to

Far Eastern ports by 3,000–3,500, to Australian ports by 1,200 miles, as against the Cape of Good Hope route. From American North Atlantic ports a smaller saving in distance is effected to Indian and Eastern ports, though not to Australian. The Panama Canal, through the isthmus of that name, between North and South America, is approaching completion. It does not reduce the distance from European to Asiatic or Australian ports, though it may (by a little) to those of New Zealand, as against the Suez Canal; but of course it very greatly reduces the distance from North American Atlantic ports to Pacific ports generally, and from European to American Pacific ports, as against the Cape Horn route. The opening of the Panama Canal may be expected to affect in particular the import trade of Mexico, Guatemala, Honduras, Salvador, Nicaragua, and Costa Rica; Colombia, Ecuador, Peru, Bolivia, and Chile; Australia and New Zealand; the Philippines, China, and Japan—countries of which most have considerably increased their trade with the United States of recent years, and are expected to do so to a large extent when the canal is open.

These two isthmuses, Suez and Panama, have been regarded as serious obstacles to sea-traffic from its earliest stages. From time to time water communication between the Red Sea and the Mediterranean had been established by way of the Nile and canal since a period 1,400 years or more before Christ. And when in the sixteenth century the navigators who followed Columbus were convinced that no sea route to the Far East lay between American lands, the idea of an isthmian canal was immediately conceived.

Another type of ship-canal is that which serves the same purpose as a deep estuary in carrying sea-traffic inland, thus avoiding land carriage—making, in fact, a port of an inland town. Such is the Manchester ship-canal, which carries cotton and other goods directly to Manchester, and saves land carriage from Liverpool.

Roads. In a country like England, where both road and railway systems are highly developed, roads serve, as far as trade is concerned, almost wholly for purposes of local distribution, and as feeders to the railways. With the development of motor traction, however, the use of the roads has been to some degree extended; thus a considerable amount of long-distance mail traffic is carried on over them. In a thickly populated country where the railway system is less developed, the roads are proportionately more important to trade, as in India, which in the Grand Trunk Road from Calcutta to Peshawar possesses one of the finest thoroughfares in the world, bearing a heavy traffic. In countries of comparatively sparse population and recent settlement, where there are navigable rivers, these may have fulfilled the needs of communication until the coming of railways; thus some parts of North America are without road systems, as the rivers first, and then the railways, supplied through lines of communication. In mountainous and hilly lands, however, where there are no navigable waterways (unless lakes), roads maintain their importance over railways down to the latest stage of commercial development. Road traffic is not dependent on a level route. Railways, on the other hand, excepting rack lines, are limited to comparatively slight gradients, and unless the land is naturally level, the construction of railways involves expensive cutting, embanking, and tunnelling, and, it may be, long détours by way of valleys (p. 130, *Mountain Barriers*). A simple English example is illustrated in Fig. 20; the student may find many more. This is chosen because it also shows a canal route (p. 102) over a water-parting, and illustrates the Roman road system to which reference has been made (p. 107). The modern road from Cirencester to Gloucester follows a typically direct Roman line, passing from the head of the Thames valley straight up and along a ridge of the Cotswold hills, and thence down their steep face into the lower valley of the Severn. The Roman road system may be compared with the railway systems of to-day; as modern roads act as feeders to the railway, so rough tracks must have acted as feeders to the great ancient highways. In lands where made

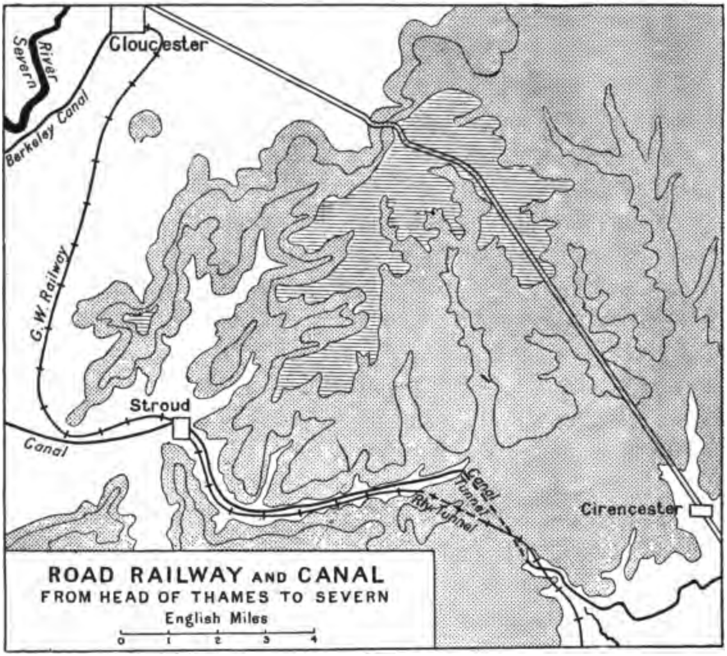

Fig. 20.

roads exist, or where wheeled traffic is possible over the natural surface, the strength of beasts of burden may be used to the best advantage. Below this stage is that of using animals to carry packs; as, for example, the camel in the North African desert and in Western Asia. At the lowest stage of transport comes human porterage, as in Central Africa, China and Japan, and some of the Andean and forest lands of South America, where there are few or no beasts of burden, and narrow footpaths are the only lines of communication.

Railways. The well-developed system of good roads, apart from the ancient Roman system, is a relatively modern creation. In the badness of mediaeval roads the 'rail-way' probably had its origin, when deep ruts were rudely repaired by setting planks along their bottoms. From this practice followed the laying of timber ways along special tracks, as was done as early as the sixteenth century for the carriage of coals in the neighbourhood of Newcastle. The next step was to cover the wooden rails with iron to ensure longer wear; the next, to make the whole rail of iron, and, last of all, of steel. Railways were worked at first by horse traction. When steam was first introduced, in England early in the nineteenth century, it was supposed that railways would scarcely serve as more than short feeders to the navigable rivers and the system of canals which had then been recently developed—just as we have seen that in some lands railways do so serve (cp. Fig. 100). In contrast to this, we find that elaborate railway systems have deprived inland navigation of traffic (p. 102), as in England. Not only so, but in lands like Western Canada and parts of Australia, especially where there are no natural waterways, it is the railway which takes the lead in opening up new country to settlement, the rails being laid to serve, not so much settlements already existing, as lands where settlement may profitably take place if the railway already exists to carry the export produce of the land. So keenly has settlement, in some instances, followed even the planning of a railway, that construction trains on the Grand Trunk Pacific Railway of Canada, carrying ballast and materials to the head of the new line, sometimes also hauled trucks to be loaded with the first crop of grain from new land, which was broken by the plough before the railway had reached it.

Distribution of Railways. The relative density of railways in different lands may be roughly judged by comparing railway maps. In Europe a close network covers practically the whole of the west. This network is sharply marked off from others much less close (*a*) by the eastern frontier of Germany, the Carpathian Mountains and those of Transylvania, Servia, and Bosnia; (*b*) by the Pyrenees. In the United States a close network extends from the Atlantic coast inland over the eastern marginal region and the interior lowland as far as a rather sharply defined line which is not unlike the contour of 1,500 feet on the western side of the lowland. Such maps do not afford a sufficient comparison by themselves. Considering the average length of railways to 100 square miles of territory we find that Europe has not quite 5½ miles; the United States not quite 6½; British South Africa nearly 2; British India and Australia nearly 1½. Of the European countries Belgium stands first, with nearly 43 miles; but this is a small populous country with a close network of railways all over. Holland, similarly situated but possessing more ample waterways, has only 15 miles of railway to 100 square miles of territory. The United Kingdom has 19 (but the average for England and Wales alone is 27½), Germany 17, France 14. At the other end of the scale are European Turkey and Russia, and Norway, having between 1 and 2 miles. A different sort of comparison is obtained from the mileage of railways per 10,000 of the population in different lands. Europe has a little over 5 miles, Sweden leading among the countries with 16; France, Germany, and the United Kingdom have 7½, 6½, and 5½ respectively. But the United States, with its long transcontinental and other lines leading in part through very sparsely inhabited country, has nearly 27 miles. Canada, a country quoted above as one where railways have been the first line of communication developed, even preceding settlement of the land, has 42 miles per 10,000 inhabitants. The same condition is strongly marked in Australia, where in Queensland the mileage ranges as high as 70, and also in British South Africa and Argentina. The Indian proportion is only one mile, and the Chinese only one-eighth of a mile. The number of trains daily over a given mile of railway may of course range from many hundreds in the neighbourhood of great commercial and industrial towns to

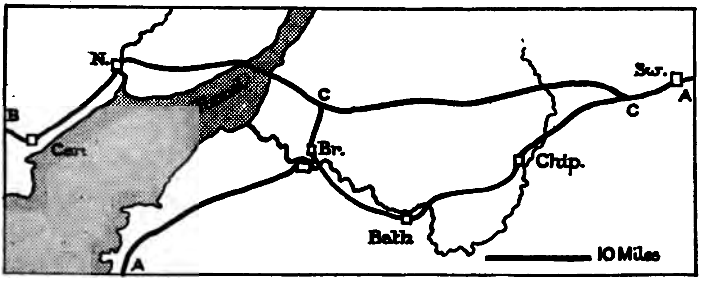

Fig. 21. The Severn Tunnel (Great Western Railway) routes from London, &c., to South Wales. A–A represents the old main line from Swindon by Chippenham and Bath, from which at Bristol (Br.), but avoiding the main station there, direct trains to South Wales diverged, until the shorter line, avoiding large towns, was built (C–C).

half-a-dozen or fewer in sparsely inhabited lands. But the average distribution of traffic over the railways in the United Kingdom is nearly 50 trains daily, in Germany 30, in France 25, in the United States not quite 20. For goods-trains alone the figures are respectively 18, 15, 12, and 8. In England double tracks are usually seen except on unimportant branch lines. In countries where traffic is lighter this is not the case. In the United States all the railways except about one-twenty-fourth of the total length have single tracks only. In the first stage of developing a railway system in an already settled country the natural object of a railway between any two towns would be to serve also any important centres lying on a reasonably direct course between them. At a later stage of development a main line may avoid important centres on the old route. Fig. 21 gives an example, and the student may easily find others. Distances are thus shortened, and through traffic is not delayed by passage through many large towns with crowded stations and numerous junctions.

Transcontinental Railway Routes in Europe. The greatest European transcontinental routes may be arranged in diagram form as shown in Fig. 22, and may be followed out in greater detail on Fig. 23, which shows the main railways and chief sea-routes of Europe. The northern of the great west-east routes, through Berlin, draws to itself in the neighbourhood of Hanover lines from all North Sea ports south of Hamburg, and also the route from Paris by Namur and Cologne. Another great west-east route is that of Paris-Strassburg-Munich Vienna. The line Cologne-Frankfurt-Regensburg-Vienna marks part of an important diagonal route from north-west to south-east. The north-south routes appear plainly between the ports of the Channel, North Sea, and Baltic and those of the Mediterranean (Marseilles and the Italian ports—Genoa, Naples, Taranto, Brindisi). The Rhine valley from Cologne to Basel stands out as a great central artery joined by a series of diagonals from north-west. The Alpine tunnels and railway passes (p. 130) appear in their places in the scheme. These railways and others from the northern and Mediterranean ports are of prime commercial importance to the great inland centres. Land transport (especially over heavy gradients on mountain lines) is more costly than sea transport. When goods come from the East by Suez for Northern France or Germany, it would save much time and distance to tranship them at an Italian port or Marseilles, and carry them overland, instead of taking them round Europe by sea. This saving of time, however, for bulky goods, does not usually counterbalance the higher cost of overland carriage. But valuable goods of small bulk, or perishable goods, may follow the land routes in such cases. For mails and passengers, an overland route from a Channel to a Mediterranean port saves about a week on the journey from England to India or Australia.

The only Eurasian transcontinental railway is the Trans-Siberian, which runs from Moscow by Samara, Ufa, Omsk, Irkutsk, and Harbin in Manchuria, whence there are connexions both with Vladivostok and Tairen (Dalny), and into China. This line has opened up a large trade from the East into European Russia, chiefly in grain, animal produce, and tea. The Bagdad Railway will run through Asia Minor and along the Euphrates valley. It will connect the Persian Gulf with the Asiatic shore of the Bosporus, and except for the break caused by that strait will form, with the railway from Western Europe to Constantinople, an Eurasian transcontinental line.

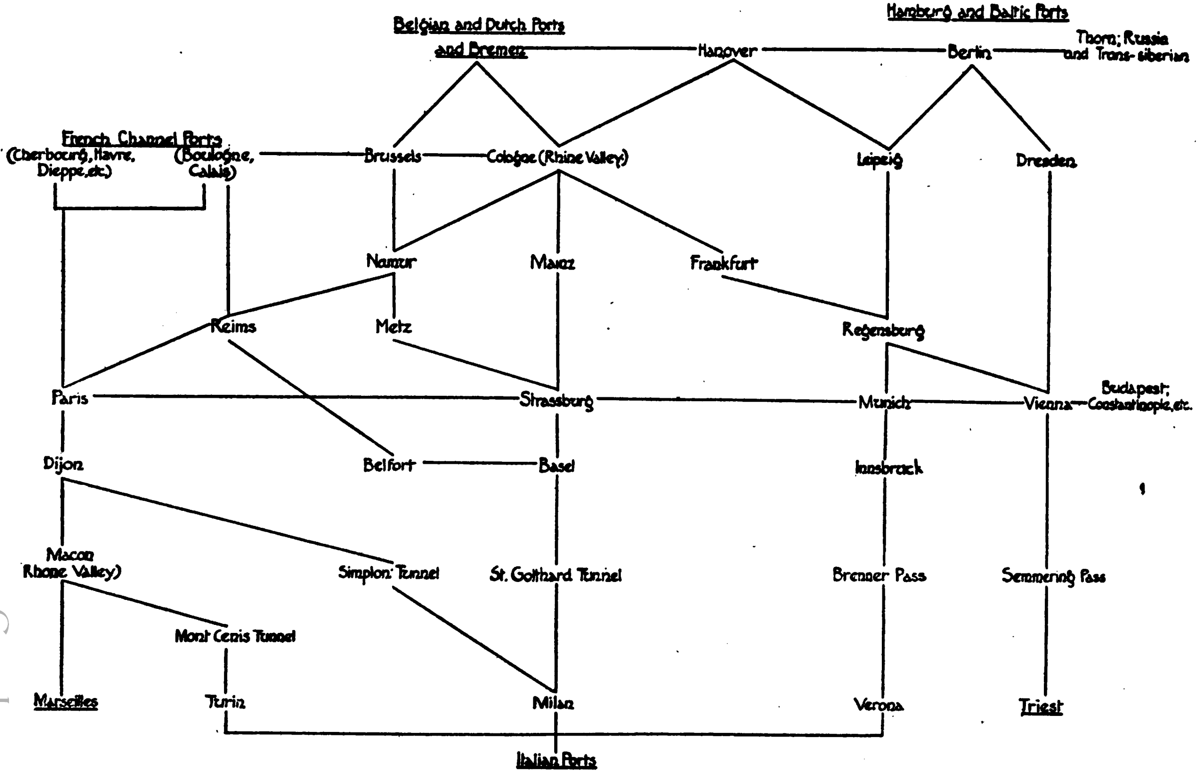

Fig. 22. Diagram of Main Transcontinental Railways in Western Europe.

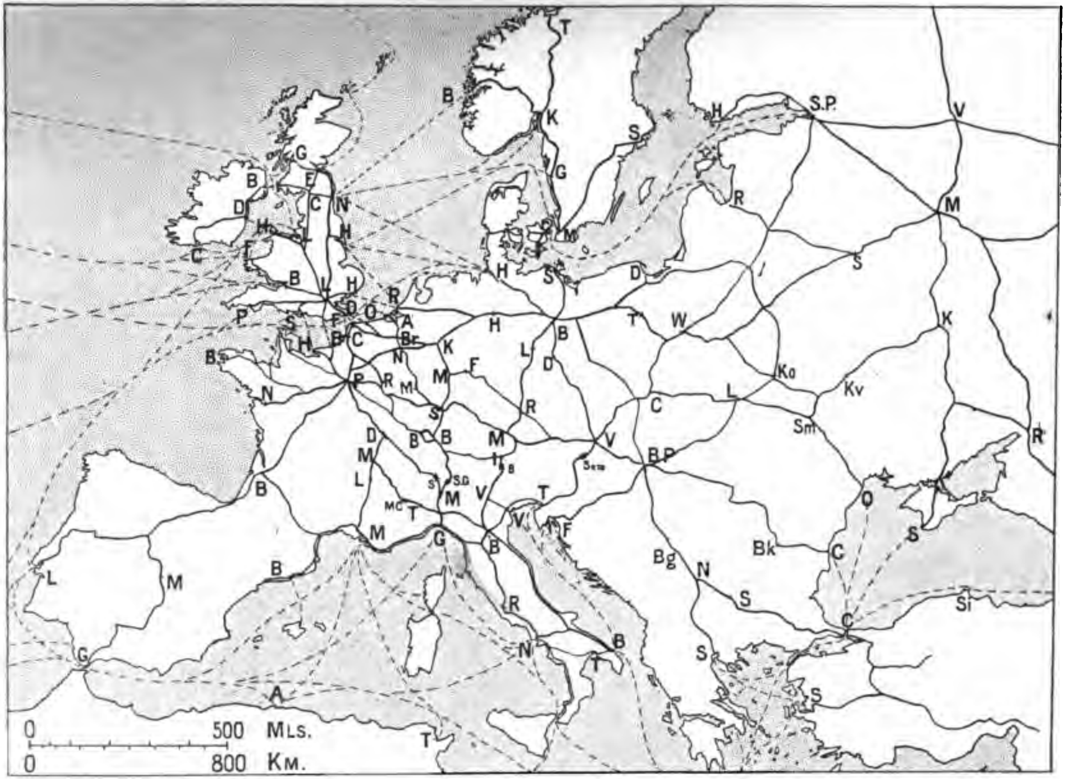

Fig. 23. Main Railways and Sea-routes of Europe.

524.11

There are also schemes for a line through Persia, to connect the European with the Indian railway system.

Mountain Barriers. The relation of railways and roads to a mountain barrier may be generally stated thus. In settled lowlands along the foot of the mountains (piedmont country) a route may be looked for, parallel to the mountain-base, and connecting a series of towns. The position of these towns will be mostly determined by the mouths of valleys opening upon the plain, and from them branch roads or railways will run up the valleys, either merely serving the settlements within them, or else also giving access at their heads to passes across the mountains. As a first stage of railway development in mountain-districts, lines will be pushed up the valleys only so far as construction is profitable, and communications higher up, or across passes, will be carried on by road. At a later stage railways may be carried right across the mountain barrier, over passes or by tunnels beneath them.

The Alps illustrate the fullest development of transmontane railway communication. The typical piedmont line is well illustrated on the Italian side in the lowland of the Po (Turin-Milan-Verona-Udine). Five railways crossing the system have superseded ancient commercial roads—the Semmering route between Vienna and Trieste, the Brenner route between Munich and Verona, the St. Gotthard route from Basel, descending from the pass of that name upon the valley of the Ticino and so to Milan; the Simplon route from the Upper Rhone valley, converging upon Milan, and the Mont Cenis route from the west (Lower Rhone valley) to Turin. Each of the three last involves a great tunnel, to which another will be added when a branch is carried northward from the Simplon route through the Lötschberg to connect with a line running south from Bern. An east-and-west crossing, through the Arlberg tunnel, gives access from Lake Constance and the Upper Rhine valley to that of the Inn, connecting with the Brenner route. Branch lines have been pushed up many valleys, and in the Alps there are a number of railways which ascend very steep gradients by means of a rack or toothed line, in which cogged wheels on the locomotives engage. Such lines, both here and in other parts of the world, are generally built to carry tourists to high points, but sometimes they serve the trade of a valley, as does the line from Visp in the Upper Rhone valley up to Zermatt.

The Pyrenees and the Caucasus each have railways running parallel to them to north and south. But they have formed thus far complete barriers to transmontane railways. They are alike, however, in extending from one coast to another—the Pyrenees from the Bay of Biscay to the Mediterranean, the Caucasus from the Black Sea to the Caspian. Along the Biscay coast from Bayonne to San Sebastian and along the Mediterranean from Narbonne to Barcelona, railways have been built, and thus skirt the Pyrenean barrier. For the rest there are spur-lines running up several valleys on both the French and the Spanish flanks of the range, and proposals have been made for rail connexions across it. The Caucasus barrier is turned by rail only at the Caspian end (Baku). No railways are carried up its valleys, except from the north to Vladikavkas, a town whose position is determined by the route across the mountains by the Darial and Krestovaya passes which descend on the city of Tiflis, whose position is similarly determined to the south of the chain. The same spur-line gives access to another pass-road, over the Mamison to Kutais, and so by the Riom valley and railway to the Black Sea at Poti.

The great mountain system of Central Asia, the Pamir and Hindu Kush, Kwen-lun, Himalaya, and the rest, is a complete barrier to railway communication. But the piedmont railway system is well developed in Northern India, and lines are pushed up Himalayan valleys to connect with pass-routes. Thus the line to Darjiling gives access to the road through Sikkim into Tibet. Near the north-west frontier there are lines to the foot of the Malakand Pass leading northward to Chitral, and the Khaibar Pass leading westward into Afghanistan. A Russian railway runs up the valley of the Syr-Daria to Andijan. A series of routes through the mountains descend on the frontier side—from the Kyzyl-art Pass to Kashgar, from the Karakorum to Yarkand and Khotan. There is a piedmont route connecting these three places and continuing eastward into China, running along the southern edge of the Takla-makan desert. But another route, running from Kashgar through Ak-su, along the southern edge of the desert and at the foot of the Tian-shan mountains, is more important for trade.

In South America the Andes ceased to be a complete barrier to transcontinental railways only in 1910, when a line was completed connecting Buenos Aires with Valparaiso. The case of the western mountain system of North America is different; a number of railway routes have been opened to the Pacific coast, and some of these are remarkably free of heavy gradients, considering the character of the country through which they pass.

CHAPTER IX

TRADING CENTRES. MIGRATION.

Centres of Trade. The study of the great manufacturing industries and of transport has already shown various physical reasons for the geographical positions of towns. We have found manufacturing towns established and flourishing where power is available, where raw material is available, where both are available—even where neither is now available on the spot, though one or other may formerly have been obtained there. Apart from manufactures, trading towns have grown up at certain points under the influence of certain physical conditions, which may be summarized thus: (*a*) Point of transference between any two methods of transport. Any port is an obvious illustration as the point of transference between water transport and land transport, or, if the port marks the limit of navigation of a river by seagoing vessels, from large vessels to small. Another illustration is provided by towns at the entrance to mountain passes, the passage of which may necessitate a change between rail and road transport, or between road-vehicle and pack-horse. (*b*) Point of junction of routes. If the position of a town in hilly country is studied it will often be found to stand where a number of valley routes naturally converge; another probable site is the point where a valley route through hilly country debouches upon a plain (p. 130). The confluence of rivers frequently forms the site of a town; so does the crossing of a river by a bridge, ford, or ferry. The conditions thus summarized under (*a*) and (*b*) are clearly combined in many instances.

Fairs and Markets. In Europe, at early stages of the development of transport, fairs provided the principal occasions for commercial intercourse, and they still do in some lands whose transport systems are more or less primitive. Thus in Russia many important fairs are still held; that of Nizhnyi-Novgorod is perhaps the most famous, and draws traders not only from European Russia, but from many parts of Asia, in July and August annually. We may suppose a community whose members are able individually or in small groups to supply themselves with the daily necessities, but have learnt to use manufactured articles or other commodities with which they cannot supply themselves. Under primitive conditions of transport such goods cannot be sent to them at any moment by the trader. They may have to make a journey to fetch them. Travel may only be possible, or may at least be most easy, at a particular season. Such considerations point to the congregation, at fixed periods and centres, of large numbers of sellers and buyers, when perhaps a whole year's supply of certain commodities may change hands in a few days. Fairs were very numerous in Europe in mediæval times; they were important occasions of international intercourse; governments granted permission to various towns to hold them as a high privilege, protected them, and took means to render them attractive to merchants and buyers. And as it was natural that occasions of buying and selling should be associated with gatherings for other purposes, fairs were commonly associated with religious festivals, and it was often the ecclesiastical, not the civic authorities who were empowered to hold and control them. Such fairs associated with pilgrimages are still held in India, and the Mohammedan pilgrimages to Mecca provide another illustration. A marked decline in the importance of fairs occurred in Western Europe as the means of communication became better; thus their decline dated in England from the middle of the eighteenth century, a period at which roads were being improved out of the bad state which, in view of the growing commercial activity of the country, had been long notorious. Railways completed the process of reducing or destroying the importance of local fairs and markets by making it possible to obtain commodities at any time from any distance, and (apart from the general increase of commercial prosperity due to them) they sometimes drew trade away from one town to another. Some English towns whose names include the words 'Market' or 'Chipping' (which has a similar meaning), no longer possess any special importance as centres of trade. In modern times exhibitions have been held in many cities in the greater commercial countries, at which typical products and manufactures of many lands are shown, and these (though not entirely of modern origin) occupy a place in relation to modern commerce not unlike that of fairs to commerce in earlier times.

Such fairs as remain important in the United Kingdom are chiefly connected with a specific product or group of products, being held in localities noted for those products. Thus trade in cattle, sheep, and horses is fostered by certain important fairs in England, Scotland, and Ireland; as at Weyhill in Hampshire, Norwich, Devizes, Falkirk, Ballinasloe, and elsewhere.

Migration. At early stages of man's development there have been (and on a smaller scale there may be still among primitive peoples) movements of whole tribes from one territory to another. The prime cause of such primitive movement is usually set down as a state of pressure on the food-supply, and the necessity of seeking a new home where food will be more plentiful. If that is so, the cause of migration among civilized peoples under modern conditions may be set down in contrast as pressure on the wealth-supply. The principal movement consists of emigration from European countries to America, Australia, and Africa. The emigrants may or may not settle permanently in the new lands; many do, but on the other hand many—Italians and Norwegians for example—having saved money in lands where wages are higher than in their own, return to their old homes.

Emigration and settlement under the flag of a new country may be described as the fourth of a series of stages of which the first was exploration for the purposes of gain or plunder, the second the establishment of factories or trading agencies in the newly discovered countries, and the third colonization proper. In India British dominion has followed upon the establishment of trading relations, but the climate apart from other considerations) forbids permanent British settlement on a large scale.

Emigration often takes place from a country where industries are not highly developed; thus Norway, Ireland, and Portugal send forth a number of emigrants high in proportion to their total populations. The United States of America, which received over twenty millions in ninety years from 1820, still receives the great majority of those who emigrate from Europe to other continents; though the Iberian Peninsula provides an exception, Portuguese emigrants going mainly to Brazil, Spanish to Mexico, Cuba, and South American countries, to which blood-relationship and community of languages naturally attract them. Italy, from which emigration is very heavy, besides sending many emigrants to the United States, sends many also to Argentina and Brazil. Austria-Hungary does the same, but a greater number go to Canada. Germans have ranged widely, but the proportion who have gone elsewhere than the United States is small.

Though the United Kingdom sends many thousands to the United States (and in particular Irish emigration directs thither by far its strongest stream), a number as large or larger now goes annually to Canada, which has received on an average about twice as many British emigrants as the Australasian and African territories together; though emigration to Australia, in particular, has recently increased rapidly. On an average of five recent years the annual number of immigrants into the United States was not far short of a million, in addition to which there is a large movement (in both directions) between the United States and Canada. During the same period immigrants from Austria-Hungary represented a quarter of the total, those from Italy over a fifth, from Russia and Finland somewhat under a fifth, and those from the United Kingdom under a ninth. Scandinavians numbered less than a twentieth, and Germans a thirtieth. In addition to emigration from Europe to other continents the movements from Germany, Italy, Russia, &c., into England should be borne in mind. Besides such movements there are periodical or seasonal migrations like that of Irish harvesters to England, and also those of labourers to specific tasks, like the construction of the Panama Canal, for which labour cannot be recruited on the spot. A large number of Italian labourers make these temporary migrations. In the same category is coolie labour, an expression applied to labourers from India, China, or other far eastern countries, and derived either from the name of an

Indian people or from a word meaning 'to hire' in one of the Indian languages (Tamil). Such labourers have been introduced (as a rule) into hot lands where sufficient native labour was not to be had locally or white labour was impossible for climatic or other reasons. Thus Indian labourers have been introduced into Mauritius and the Seychelles, British East Africa, Natal, Fiji, the West Indies, and Guiana. Sometimes such labourers become permanent settlers. Chinese labourers have similarly been employed in Guiana, the West Indies, and other American lands, and in South African mines. Moreover, there is a considerable emigration of Chinese throughout the Malay lands generally, and of Indian labour into Ceylon, the Assam tea-plantations, and elsewhere. Apart from such organized movements of labourers, Chinese and also Japanese emigration has been mainly to the United States. An outcome of modern industrial development and the concentration of great manufactures in great towns is migration from rural districts to towns. Thus a decrease in the population of rural districts in England set in about the middle of last century, while the population of the great towns was increasing largely; and it was only at the end of last century that an increase (and that a small one) was again recorded in the rural population.

CHAPTER X

THE GRAIN TRADE AND KINDRED SUBJECTS

Grain Trade. *Import of Wheat into the United Kingdom.* Physical considerations affecting the cultivation of wheat have been dealt with in chapter iii; we may now consider certain points in the economic geography of the grain trade in connexion with our own food-supply. In the chapter referred to, stress was laid upon the extension of wheat cultivation in new lands. In this connexion it is of interest to observe some of the changes which have taken place in the chief sources of wheat and flour imported into the United Kingdom. In 1872 Russia was the first source, exporting twice as much as the United States, which exported more than twice as much as Germany, which ranked next, and was followed by France, Egypt, Canada, and Chile. In 1900 the United States sent considerably over half the total imported by the United Kingdom; Argentina had by then entered the field and stood second; Canada, Russia, and Australia followed, and the German export was still not inconsiderable. In chapter iii it was stated that on an average over a recent term of years the chief exporting countries were the United States, Argentina, Canada, Russia, India, and Australia, in that order. The years under consideration were 1906–10, and in them the six countries named supplied nearly 95 per cent. of the wheat and flour imported into the United Kingdom. The home production was approximately equal to the import from the leading country. The import from Rumania made up a considerable proportion of the remainder, and there were small irregular imports from other countries, such as Germany, France, Hungary, Turkey, Bulgaria, Persia, New Zealand, and Chile. The German and Chilean imports had wholly lost their former proportional importance. The United States and Argentina, leading on the average, maintained their positions actually in four years out of the five, but in 1910 the order varied markedly—Russia, Canada, United States, India (which, it may be added, had taken first place in 1904), Argentina, and Australia. Returning to the average, however, and taking the value of the total import in millions of pounds sterling at 46, we find the values for the chief countries to have been approximately —United States 12, Argentina 8½, Canada 7, Russia 6½, India 5½, Australia 4. The United Kingdom imported about two and a half times as much wheat in 1910 as in 1872. The United States sent rather less than twice as much in 1910 as in 1872 (though it sent four times as much in 1908). Canada sent over eleven times as much. For Russia the average for 1906–10 was roughly equal to the amount in 1872. None of the other three leading sources in 1906–10 appeared in 1872. In that year the export from Australia was trifling; the irrigation schemes in North-western India (p. 145), which helped to make that country one of the great wheat-producers, had mostly not been undertaken, and the agricultural development of Argentina (at any rate, on the lines which have brought it to its present position) did not begin till some ten years later.

As two-fifths of the wheat import into the United Kingdom comes from North America, we look to that continent for an example of wheat-farming on the scale of highest commercial development. Some of the great farms of the interior lowlands, called bonanza farms, have an extent of ten thousand acres or more. Ploughs and machines of huge size for reaping and threshing are used. The produce is loaded upon wagons, and, without being touched by hand (for the whole system of transport is mechanical), the grain is stored in elevators from which it is poured into railway trucks. These convey it to such centres as Duluth, Minneapolis, Chicago, or Fort William. At Minneapolis and other places are great flour-mills, for between a third and a quarter of the import from the States into the United Kingdom is in the form of flour, whereas less than a seventh is in that form from Canada, and the amount of flour received from the other chief exporting countries is, proportionately, insignificant. Most of the wheat from the field of the North-west 'goes by way of the Great Lakes through the Sault Ste Marie Canal to Buffalo, where it is shipped by rail or canal to New York, Philadelphia, or Baltimore. . . . The cheapest transportation in the world is found upon these lakes. . . . The greater lake vessels, called "Whale-backs", carry cargoes up to 250,000 bushels.' The wheat markets in Chicago, Minneapolis, and Buffalo, and the farmers themselves, are kept informed of the conditions of the market elsewhere, and of events that may affect the trade; such as a shortage of crops for export owing to failure of the monsoon rains in India, or an attack of locusts in Argentina, political or labour disputes which might stop or delay transport from any of the great exporting countries, and so forth.

In chapter V a contrast was drawn between very densely populated lands of the temperate regions, whose inhabitants are supplied with wheat from a distance, and the similar hot lands where rice is grown in sufficiency on the spot. It is not difficult to carry the contrast further, and to distinguish the people who develop wide commerce not only in food-stuffs, but in other commodities, from those who, having been always able to supply themselves with food, have less inclination to commercial intercourse in general with others. In this connexion it is worth noticing that though the great grain trade above described is a modern development—England, for instance, was practically self-supporting in wheat as late as the first half of the last century—it has historical parallels. Egypt is often spoken of as the granary of the Mediterranean in early times; and shortly before the beginning of the Christian era the grain supply of Rome, under the personal supervision of the Emperor Augustus, was being brought to the extent of two-thirds from Egyptian and North African fields. Other distant territories were also drawn upon, such as the lower Danubian basin, which had thus a grain trade then as, under the names of Romania and Bulgaria, it has now. In the middle of the fourth century we find that the Rhine territories of the Roman emperors were being attacked by invading tribes, and agriculture and the grain export to Rome were stopped in consequence. A supply of wheat was then drawn from Britain, and a large fleet of ships was employed to convey it across the North Sea and up the Rhine without transhipping, so that it could be easily protected, while on the river, from the enemy.

Irrigation. The methods and objects of irrigation are various. The waters of a river may be used by diversion and distribution through artificial channels from their natural course, or may be stored by means of dams. In the absence of rivers, artesian wells may be sunk. This term, derived from the old French province of Artois, where the method was practised in early times, is properly applied to wells sunk through a dry impermeable stratum to a water-bearing stratum below, from which the water rises through the well under natural pressure. Such wells, which are commonly used for domestic water-supply, have been applied to the fertilization of arid soil in Australia, in Algeria, and elsewhere. The object of irrigation may be to render cultivation possible where under natural conditions it is impossible, as in the north-west of India and the arid lands of North America; or it may be simply to extend the range and value of crops, as in Lower Egypt, where only the introduction of improved methods of irrigation made it possible to grow cotton and sugar; or, again, it may be, not to improve agriculture under the usual conditions of water-supply, but merely to guard against the temporary failure of those conditions, as in some parts of India, where the monsoon rains fail sometimes. Again, there may be irrigation in lands which are not arid; in England, for instance, the system called warping is practised along the lower courses of rivers entering the Humber estuary, the water being led over the low-lying fields in order to cover them with its fertile silt. Drainage must accompany irrigation to guard against the land becoming water-logged and sour. But as distinct from irrigation it does not comprehend so many great works, though the fen lands of Eastern England and the Low Countries across the North Sea supply notable examples.

Irrigation may be extremely difficult when the river to be used is a heavy torrent at seasons of heavy rainfall, as during the monsoonal rains in many parts of India, but during the dry season shrinks to a little stream. In such cases not irrigation alone, but also the regulation of floods must be provided for, as in the Mahanadi delta in Orissa, India. On the other hand, a river fed from glaciers keeps up its volume in a hot dry season, as the ice is melted. Rivers of Northern India, flowing from the Himalayas, are thus naturally regulated. Another form of natural regulation is that of lakes or swamps in the upper courses of rivers. The Nile is thus regulated, showing, in proportion to its size, no very great range between high and low water. The flow of the rivers Ticino and Adda in Northern Italy, which supply a fine system of irrigation, is regulated by their lakes, which form natural reservoirs.

The ancient civilized peoples who inhabited Egypt, the Lower Tigris and Euphrates valleys, South-western Arabia, and other parts of the hot lands of South-western Asia and North-eastern Africa, constructed great irrigation works. In many places where the remains of ancient works are seen the land in more recent times has been allowed to relapse into aridity. But the Nile irrigation has never been let out of use. Since the British occupation works have been extended and principles improved, and these have stood the test of floods below the normal height, such as had previously caused at least partial failure of irrigation and crops, or at worst, famine. The original system (apart from primitive systems of baling up water in buckets, with the assistance, at the best, of some simple mechanism) was to embank the river above the highest flood-level. The Nile, like other rivers with a long plain track, has by the gradual deposition of alluvium built up its bed so that when high it flows at a level generally above that of the lands immediately along its banks. At the season of flood, then, the waters are admitted through the embankments to cover these low lands, which are drained, when the river falls, after the waters have deposited their fertile silt. Such (with the addition of works to guard against the failure of irrigation during a low flood) is the common practice still in Upper Egypt, but in Lower Egypt generally, and in Upper Egypt to some extent, barrages, canals, and other works make it possible so to use the water-supply as to provide irrigation throughout the year, instead of during the flood season only, and also to extend the irrigated area. The available supply has thus been put to such thorough use that sometimes, with the river at its lowest, no water would reach the sea. Finally, a great dam has been built at Assuan, so constructed that water can not only be allowed to pass through without check when at its highest and most fully loaded with silt, but can at other times be stored, so that the supply below can be more effectively regulated.

Irrigation may involve works of a very different character to those just described. Thus, there are places where water is carried from a valley which does not contain agricultural land to another which does. That has been done, by means of a tunnel through intervening hills, from the Gunnison river to the valley of the Uncompahgre in Colorado. There is an instance in India, in which the upper waters of the River Periyar, flowing down the western slope of the Ghats, and well supplied by the heavy rainfall on that side, have been dammed and carried through a tunnel to the drier eastern slope. The Uncompahgre work is one of a number of important works which have been carried out in the arid lands of the Western United States since, at the beginning of this century, the whole question of irrigation was taken up by the Central Government, instead of being dealt with locally by individual States or corporations, and a 'Reclamation Service' was created.

In India the most notable works designed to extend the area of cultivation (apart from those whose object is to provide against failure of the rains) are in the dry districts of the North-west. Here a number of large irrigation canals have been constructed; the largest, the Chenab[1] Canal, ten years after its beginning, served a district of nearly 3,000 square miles which had been practically desert, and the settlers on the new lands, introduced from overcrowded districts, numbered over three-quarters of a million. In Madras the deltas of the three great rivers, Cauvery, Godavari, and Kistna, are the sites of the principal of a number of important irrigation systems, and there are many minor systems; in the south (Madras and Mysore) there are innumerable 'tanks' or reservoirs.

---

[1] The Chenab is one of the 'Five Rivers' of the Punjab.

Famine and Failure of Crops. The mention of Indian irrigation works leads naturally to the subject of famine, inasmuch as some of those works, as in Orissa and Bundelkhand, have been constructed mainly or wholly as a protection against failure of the rains and consequently of the crops. It is in countries where the population, and particularly a very dense population, is almost wholly dependent on agriculture and lives on its own produce, that famine is most likely to occur; and it is therefore characteristic of such lands as India, China, and European Russia, while among special instances may be quoted the failure of the Irish potato crop in 1846–7. The people, in the event of such failure, have no other resources to draw upon, nor can they afford to buy food if it is available. That it should be available, however, is obviously essential for purposes of relief, and therefore railways and other modern facilities of transport are favourable to the prevention or mitigation of famine. In a large country like India scarcity does not (or at least is extremely unlikely to) occur in every part at once, and much depends upon the facilities for rapidly throwing food-supplies from lands where the crops have not failed into districts where they have. Under ancient conditions, when communications were poor, local scarcity of food was much more liable to occur than now, and cases are quoted of parts even of England suffering from scarcity while others had plenty. Under modern conditions, when grain is imported from many different lands, as it is into the United Kingdom, a famine due to natural causes is not to be imagined. Even if the wheat-export from Russia or India were much reduced (as on occasion it has been), owing to local scarcity within their own frontiers, the deficiency is made up from elsewhere. But some failure of transport, as in the event of war or a labour dispute, might cause a shortage of food-supply.

The great irrigation works mentioned above are nearly all in arid regions and combat drought, but drought is not the only cause of failure of crops. We know well enough how seriously not only a very dry summer but also a very wet one may affect agriculture in England. Such effects are therefore the more marked in countries more subject than England to very heavy rain or, again, to those traversed by large rivers liable to heavy floods, like the Hwangho in China, which has sometimes caused widespread devastation. Hail-storms, with stones of a size unknown in England, sometimes cause great damage, as in the United States, South Africa, &c. Unseasonable winds and frosts may injure the more delicate crops, especially those of the warmer lands. But drought is the most potent of climatic causes of the failure of crops, and it may be added that it may also seriously affect pastoral pursuits, as in Australia, where great numbers of sheep sometimes perish for lack of water and pasture. Volcanic outbreaks (apart from their direct danger to life) have sometimes ruined staple crops, as in some of the West Indian islands. Among other scourges, some, like locusts, swarming in vast numbers, destroy all vegetation, and cause widespread damage in Argentina, South Africa, the European Mediterranean region, and many other lands. Others, again, attack certain plants. Such is the insect of the genus phylloxera, which is a plague in many vine-growing countries, and about 1865–85 actually stopped cultivation in some parts of France. Among animal plagues may be mentioned the Australian rabbit and the vizcacha of Argentina, both, owing to their vast numbers, destructive of pasture lands.

CHAPTER XI

THE BRITISH ISLES

Districts, Products, Industries, and Communications. Commerce of the United Kingdom, with particular reference to British Imperial Commerce.

The population of the United Kingdom is nearly 45¼ millions, out of which over 36 millions belong to England and Wales, 4¾ millions to Scotland, less than 4½ millions to Ireland. In each division certain well-marked areas of dense population coincide with the chief industrial and commercial districts.

In England, the area including and surrounding London may be termed rather a commercial than an industrial district. London has many industries, but is scarcely an industrial centre. A great part of London and most of the populous surrounding country is entirely residential and free of large factories. Very different are the populous mining and manufacturing districts, which extend in a curving belt from South Lancashire and the West Riding of Yorkshire to South Wales. Over the lowland of South Lancashire an urban population is so evenly spread that the whole district almost resembles one vast town. The neighbouring West Riding provides a contrast; here the dense population is confined to comparatively narrow valleys between the high, almost uninhabited moorlands of the Pennine chain. Farther south are the midland industrial districts, covering parts of Cheshire, Derbyshire and Nottinghamshire, Leicestershire and Staffordshire, Warwickshire and Worcestershire. Farther north are the mining districts of the Cleveland district of Yorkshire, Durham, and Northumberland. In Scotland the bulk of the industrial population is centred in the Clyde-Forth Lowland. In Ireland the most populous districts are in the north-east near Belfast, and in the immediate neighbourhood of Dublin.

England. The boundary of industrial England, in its simplest form, is a line between the Humber and Severn estuaries. A few important centres of manufacture lie east of that line, but not many in comparison with those west of it. An agricultural division (see Figs. 24–27) is made by a line running more nearly north and south, following the western boundaries of the East Riding of Yorkshire and the Counties of Nottingham, Leicester, Warwick, Oxford, Berks, and Hants. East of that line lie the arable or corn counties; west of it the grass or grazing counties. And physically, there is a marked and similar division between west and east, the hill-country of the west (including Wales) and north contrasting with the lowlands of the east, while the Midland district is transitional between the two. These distinctions are generalized; there are manufacturing centres east of our industrial line, there are corn lands west of our agricultural line, and grazing lands—even hill-pastures—east of it. But the distinctions are important, and particularly so with regard to minerals, almost all the mining industries lying west and north of the industrial line, and in or near hilly tracts (compare chap. vii).

Wheat, barley, and oats are the grains grown almost exclusively in England. The counties specially productive of wheat in proportion to their area form a curved belt from Cambridge and Huntingdon, through Bedford and Hertford to Essex; while Norfolk and Suffolk are specially noted for barley, though this does not mean that the wheat crop greatly exceeds that of barley, or *vice versa*, in these districts. Kent is pre-eminent for fruit and hops. Fruit-farming is also especially important in a midland and western district, from Worcestershire and Herefordshire southward to Devon. In connexion with agriculture generally, it should be observed that the rainfall is heaviest over the western hilly division, averaging generally 35 inches a year (up to 60 inches or more over considerable areas in Wales and the Lake District of the north-west), whereas in the eastern counties it falls as low as, or lower than 25 inches. But in the latter district the flat lands (especially with heavy soils) retain moisture more easily than the slopes of the western hills, so that there is, broadly speaking, a tendency for difference of configuration to counteract difference of rainfall in respect of their effect on agriculture.

The English fisheries, as has been seen (chap. vi), are of first-rate importance, and Grimsby is the first fishing port. The principal fish is the herring, and the principal ports for this special fishery are Yarmouth and Lowestoft. In haddock, cod, and plaice the east coast ports lead those of the south and west; those of the south lead those of the west for herring and plaice; those of the west lead those of the south for haddock and cod. Mackerel and lobsters are of special importance in the south-coast fisheries, pilchard more locally in those of the south-west, hake in those of the west.

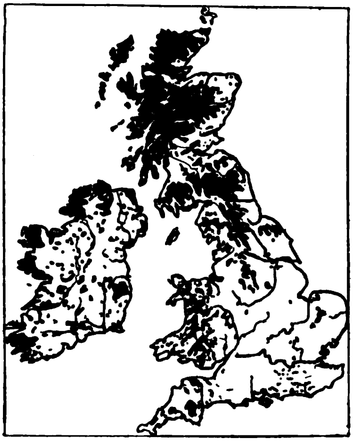

Fig. 24. Poor Pasture-land in British Isles, chiefly hill pastures.

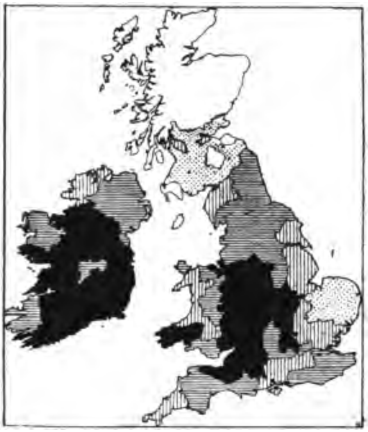

Fig. 25. Distribution of rich Pasture in British Isles.

Black counties with over 500 acres per 1,000 acres; horizontal lines 375–500 acres; vertical lines 250–375 acres; dots 125–250 acres; white under 125 acres.

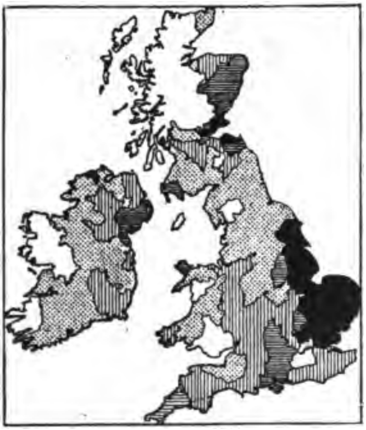

Fig. 26. Distribution of Cultivated Land in British Isles.

Black counties with over 500 acres per 1,000 cultivated; horizontal 375–500; vertical 250–375; dots 125–250; white under 125.

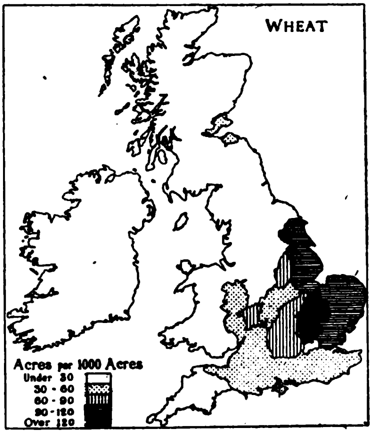

Fig. 27. Distribution of Wheat in British Isles, showing the number of acres out of every thousand on which wheat is grown.

Large oyster beds are found off the shores of North Kent and Essex.

The English coalfields (Fig. 28), considered in detail, are thus grouped: *Northern*, Durham and Northumberland;

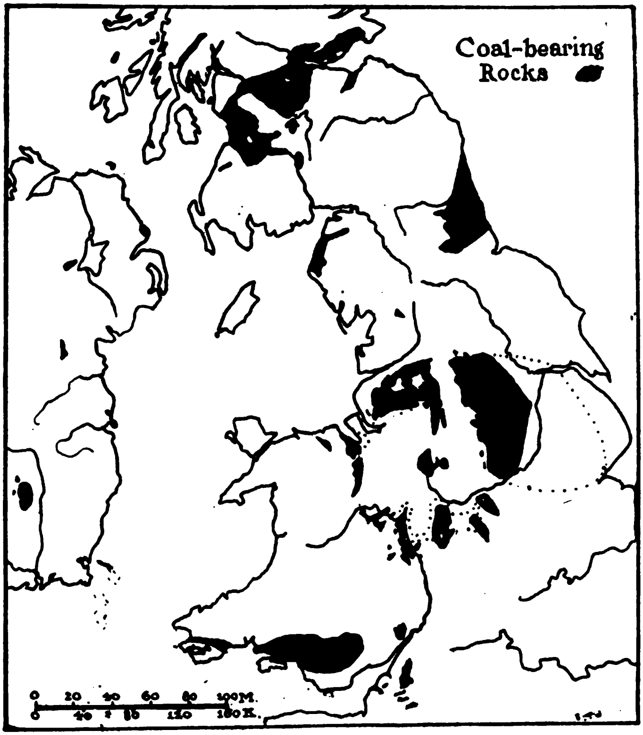

Fig. 28. Distribution of Coal in the British Isles. (Outside the area of this map lies the Kent coalfield).

Yorkshire, &c., West Riding, Derbyshire, Nottinghamshire, Lancashire, and Cheshire; *Midland*, Shropshire, Leicestershire, Staffordshire, Warwickshire, Worcestershire; small detached fields are in Cumberland and Westmorland, the North Riding of Yorkshire, Gloucestershire (Forest of Dean), Somerset; and the Monmouthshire field which, though actually in England, belongs to the great South Wales field. Coal has also been discovered by deep borings in Kent. Omitting the South Welsh field, we find that three of the above counties together produce half the total amount of coal raised in England—these are Durham, the West Riding of Yorkshire, and Lancashire. The Cleveland district of the North Riding produces nearly half the iron ore raised in England; there is richer ore but less of it in the Furness district of Lancashire and Cumberland, and iron is also mined in the East Midlands—Lincolnshire, Leicestershire, and Northamptonshire, and elsewhere. Other minerals are of small importance comparatively: such are the tin of Cornwall, the copper of that county and some parts of Wales, the lead of Derbyshire, Durham, &c. In Cheshire salt is largely evaporated from brine, and found also as rock-salt. The slates of the Lake District, North Wales, and Cornwall and Devon, the granite of Cornwall and the Charnwood Forest district of Leicestershire, may be mentioned; but most parts of England possess good building stone of some sort or other.

Reference has already been made (chapter vii) to some of the principal localized industries. The greatest of them divide broadly into textile and metal groups. The cotton manufacture belongs almost solely to South Lancashire, but it occupies a few towns in Cheshire, Derbyshire, and Yorkshire. The woollen industry belongs primarily to the West Riding of Yorkshire (with a few Lancashire towns), though among other districts where it used to flourish it survives in the Stroud valley of the Cotswolds in Gloucestershire. Manufactures of hosiery and lace are characteristic of Leicester, Nottingham, and the neighbourhood; and that of silk goods of Congleton, Macclesfield (Cheshire), and their vicinity.

The coal and iron districts have their iron and steel manufactures; the metal industries of Sheffield and of Birmingham and the Black Country have been mentioned (pp. 89, 94). The many branches of the industry in the district of which Birmingham may be regarded as the centre range from engineering to the manufacture of nails, tools, and all sorts of small metal goods, and to work in the precious metals. Motor cars and cycles are specially characteristic manufactures in Coventry and Birmingham, needles in Redditch, and so on. Among other localized industries the Staffordshire potteries have also been mentioned (p. 97), but further examples are the straw-plaiting industry of Luton, the glove-making of Yeovil, and the boot and shoe-making of Rushden, Wellingborough, and other places in Northamptonshire.

A dozen principal railway systems, ten radiating from London and two confined to northern counties, form the chief commercial highways of England and Wales. The *Great Northern* serves Lincolnshire, Nottingham and other east-midland centres, and the West Riding of Yorkshire; it is in close connexion with one of the northern-county systems, the *North-Eastern*, which serves the port of Hull and those of the iron and coal-fields of the north-east—Middlesbrough, the Hartlepools, Sunderland, and the Tyne ports. These two systems, with the North British of Scotland, provide the 'east coast' route from London to Scotland. The *Midland*, carrying its main line through Leicester and Leeds to Carlisle, and a 'west-and-north' line from Bristol through Birmingham and Derby, provides a route to Scotland by Carlisle, has direct access to the South Welsh, Midland, Yorkshire and Lancastrian

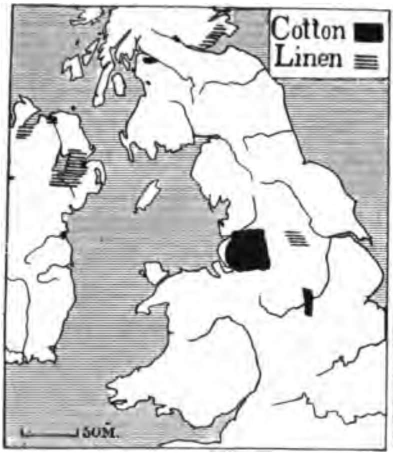

Fig. 29. Distribution of Cotton and Linen Manufactures.

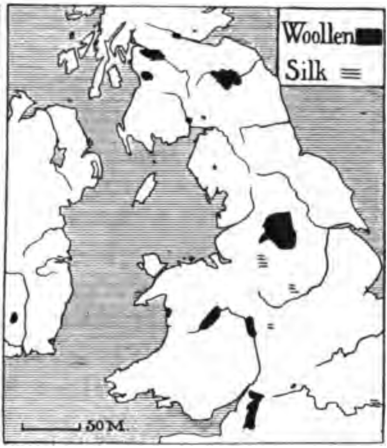

Fig. 30. Distribution of Woollen and Silk Manufactures.

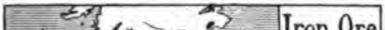

Fig. 31. Distribution of Iron ore, Ironworks, and Shipbuilding.

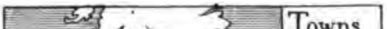

Fig. 32. Towns with over 50,000 Inhabitants.

industrial districts, and possesses lines in the north of Ireland also. The *Great Central* has a T-shaped line from London to Sheffield, and thence to Manchester, &c., on the one hand, and Lincolnshire (Grimsby, &c.) on the other. The *London and North-Western* by its main line by Crewe to Carlisle provides a third route (the 'west coast') to Scotland; it also serves Birmingham and the Midlands generally, Liverpool and other Mersey ports, North Wales and the port of Holyhead, whence, as also from Liverpool and Fleetwood, there are connexions with Ireland. It also has a line to the South Wales coalfields. These, however, are served directly from London by the *Great Western* system, which serves the Welsh ports of Swansea, Cardiff, and Fishguard, and also extends to Birmingham and the Mersey, while its other principal lines serve Bristol, Plymouth, an dthe south-west generally. This system and the North-Western jointly have a 'west-and-north' line by way of Hereford and Shrewsbury. The *London and South-Western* serves the parts of England indicated by its name, and has its chief port at Southampton. The *London, Brighton, and South Coast* serves that coast between Hastings and Portsmouth, and its port of Newhaven shares cross-Channel traffic with the South-Western and the *South-Eastern and Chatham*, which serves Folkestone and Dover. The *Tilbury and Southend* line (a section of the Midland) runs along the north shore of the Thames estuary; the *Great Eastern* serves East Anglia generally, with its chief port at Harwich. The other great provincial system (besides the North-Eastern) is the *Lancashire and Yorkshire*, serving the industrial districts of Lancashire and the West Riding; it has the ports of Liverpool and Fleetwood on the west coast and of Goole on the Humber.

From the mention of the chief ports above and at p. 112 we gather the importance to commerce of the estuaries of the Thames, the Mersey (with the Manchester Ship-Canal), the Tyne, and the Tees. The Severn estuary is not in the same way a great highway for ocean traffic above Avonmouth, the outport of Bristol, but the Berkeley Ship-Canal gives access for small ships to Gloucester. The Thames, the Trent, and the Severn carry a fair inland traffic, and so do some of the canals, in coal and other bulky commodities, in spite of railway competition: such are the Aire and Calder navigation between the West Riding and the Humber, the Leeds and Liverpool navigation, and the Birmingham navigation and other canals in the Midlands.

Scotland. While of England only about a quarter of the total area is uncultivated, of Scotland little over a quarter is cultivated. There are great tracts of scanty hill-pasture and barren mountain land, and livestock are generally of greater importance to farmers than crops, though in part of eastern Scotland fine crops are grown, and the standard of farming is very high. Oats are by far the largest grain crop, but a good deal of barley is grown for the whisky distilleries. The fisheries are valuable; they centre chiefly upon Aberdeen, Wick, Peterhead, and other east-coast ports, the Shetland Islands, Stornaway in the Hebrides, &c. The chief coal-fields are in or near the Clyde-Forth lowland—in Lanark, Fife, Ayr, Stirling, Midlothian, and neighbouring shires; iron is worked in the same localities, and oil-shale chiefly in Linlithgowshire. There is a little lead and zinc, and there are large aluminium works using the water-power at Kinlochleven and of the Falls of Foyers in Inverness-shire. The latter works are on Loch Ness, which with Loch Lochy forms part of the Caledonian Canal route which strikes through the highlands from Inverness on the east coast to Loch Linnhe on the west.

The industrial districts of Scotland are, first, and by far the most important, the Clyde-Forth lowland; secondly, the Tweed basin in the south; and thirdly, the middle east-coast lands north from Dundee. But the last two are not the densely populated areas which we connect with great industries in England. The Clyde-Forth lowland contains many iron and steel works, engineering works and miscellaneous metal and other manufactures. Among textile industries, the manufacture of tweed cloth is carried on in Galashiels, Hawick, and other towns in the basin of the Tweed, but has spread to many other towns, and is one of the most characteristic of Scottish industries. Glasgow and Paisley are noted not only for this industry but for cotton and silk manufactures, Dundee for jute goods and coarse fabrics. The Clyde is famous for shipbuilding; its firth and estuary on the west coast, and to a lesser degree the firths of Forth and Tay on the east, are the three principal waterways for sea-traffic. Out of seven leading ports, Glasgow and Greenock are on the Clyde; Leith, Grangemouth, and Methil on the Forth; Dundee on the Tay; Aberdeen lies on the east coast north of the Tay. The Caledonian Canal, already mentioned, and the Crinan Canal which saves a long passage round the Mull of Kintyre, carry small sea-going ships. The rivers do not afford inland navigation, but the Forth and Clyde Canal connects Grangemouth and Glasgow. The Caledonian and the North British Railways serve the principal industrial centres and afford connexions with English lines, as does the Glasgow and South-Western; the Highland and the Great North of Scotland serve the more northerly parts.

Ireland is primarily an agricultural country; about three-quarters of the total area is agricultural land, but crops are small and about half the total area is under grass. Cattle and pigs are reared in great numbers, and dairy produce and bacon are exported largely. The island is noted for horse-breeding. The fisheries are valuable, but not fully developed. Ireland is very poor in minerals, and has few manufactures beyond important linen and shirt-making industries in the north-east, Belfast and Londonderry being the chief centres respectively. Belfast has also a great shipbuilding industry, and is the principal port. In Dublin and elsewhere brewing and distilling are carried on. Three large railway systems, radiating from Dublin, serve the parts indicated by their names—the Great Southern and Western, the Midland Great Western, and the Great Northern; there are besides a number of smaller systems. Communications with England and Scotland are carried on principally from Belfast and Dublin and Kingstown to Glasgow, Heysham, Fleetwood, Liverpool, and Holyhead, and from Rosslare and Waterford to Fishguard. Cork, with its outport of Queenstown, is the chief south-coast port; on the west are Limerick, Galway, and Sligo; on the north, Londonderry. There is extensive inland navigation by the Shannon and other large rivers and several canals, but little use is made of it.

COMMERCE OF THE UNITED KINGDOM.

(*With particular Reference to British Imperial Commerce*).

Proportions to the total population of the United Kingdom are: for England and Wales, 80 per cent., for Scotland a little over 10, for Ireland a little under 10. But to the total annual value of the foreign and colonial import and export trade of the United Kingdom, the proportion for England and Wales is nearly 91, for Scotland a little over 7½, for Ireland hardly over 1½.

In the tables on pages 222–226 certain leading facts appear concerning the commerce between British possessions and the mother country. The exports of the merchandise of the United Kingdom to British possessions, and the imports into the United Kingdom of the merchandise of the British possessions, are not far from balancing in value (if the difference be considered proportionately to the total). They are not, at least, so far from this condition as the imports to and exports from foreign countries. With this consideration in mind, it may be observed that the greater British possessions occupy a more important place relatively to the great foreign commercial countries in the table of exports than in that of imports on p. 226. The leading market for the produce of the United Kingdom appears there to be India; only Germany and the United States rank above Australia, and only France and Argentina in addition rank above Canada and South Africa. But in the table of imports into the United Kingdom the United States, Germany, France, Russia, and Argentina all rank above India, Canada, and Australia. South Africa (its gold being excluded, as for other countries, as well as its diamonds) falls to a low place. The imports from the leading foreign countries mentioned greatly exceed in value the exports to them, but the exports to India and South Africa largely, and to Australia to a less extent, exceed the imports from them. The tremendous significance of the food imports appears in the import table; all the six chief sources of the external wheat-supply of the United Kingdom (p. 139) appear among the eight leading countries named above.

Turning to the tables showing the principal articles of import and export (pp. 224, 225), we find that out of the total of articles classed as 'food, drink, and tobacco' the British possessions send about a quarter by value; of 'raw materials and mainly unmanufactured articles' considerably over a quarter; and of manufactured articles less than an eighth. But of manufactured articles produced for export in the United Kingdom the British possessions take well over one-third by value, whereas of the raw materials exported they take only a seventeenth part. Of these raw materials coal is by far the most important, and the British possessions draw little upon the mother country for coal. The third class, of food, &c., takes a low place in the exports of the United Kingdom. Therefore the elementary fact appears that the mother country draws mainly raw materials and food-supplies from her oversea possessions, and sends them mainly her manufactures. That is also true of her commerce at large, but to a less marked degree than in regard to her imperial commerce considered by itself, for her imported manufactured articles from foreign countries are not much less in value than the whole of her imports from her own possessions. Among the leading articles of import quoted in the table (p. 224) wool and tea appear as those of which she is able to supply the bulk of her needs from her own possessions, Australia supplying most of the wool and India and Ceylon most of the tea. The table on p. 225 distinguishes the leading groups of manufactured articles, and the figures serve to show the commercial importance of the chief industries.

CHAPTER XII

SCANDINAVIA AND RUSSIA

Norway has a population of less than 2½ millions. About two-fifths of the inhabitants are occupied in agricultural pursuits, though the area available for agriculture is less than a tenth of the whole. Forests are extensive, and most valuable in the south and south-east, and in the district around Trondhjem fiord. The cod fishery represents about half the total value of the fisheries (chap. vi); herring, mackerel, and salmon follow in order of importance. Granite is quarried for export in the district on the south-east shore of Kristiania fiord. Some silver, copper, and iron are worked. Wooden wares and preserved foods (especially fish) are manufactures of some importance. The chief industrial towns are on Kristiania fiord and the south-east (Skagerrak) coast, with Trondhjem and Stavanger. Kristiania, Bergen, and Trondhjem are the chief ports; there are many smaller ones, for the population is in great part confined to the seaboard, and the fiords and 'inner leads' between the fringe of islands and the mainland provide the principal lines of communication. In this connexion the remarkable development of the Norwegian mercantile marine has already been noticed (p. 110). Exports consist mainly of timber, wood-pulp, and wooden wares (nearly a third of the total exports in value), especially to Great Britain; and fish products, especially to Germany, Sweden, and Spain. Paper and ice may be also mentioned. There are naturally, to such a country, large imports of food-stuffs, Russia sending most of the grain, and Germany groceries; also of coal (from

England), metals, and machinery. The United Kingdom, Germany, the United States, Sweden, and Russia are the countries with which Norway carries on the bulk of her commerce.

Sweden, with a population of 5½ millions, or considerably more than double that of Norway, has an export trade about double, but an import trade considerably less than double that of Norway in value. Sweden has to import less grain and flour than Norway. There are plains in the extreme south where four-fifths of the land is under cultivation, though in the far north only about a twenty-fifth is cultivated. About half the country is forested. Oats, rye, barley, and wheat are grown, in that order of importance. Cattle are largely kept, and dairy-farming carried on. There is a beet-sugar industry of considerable value. Reference has been made (chap. ii) to the northern iron-mines of Kirunavara and Gellivara; they are richer than the midland fields, which extend from north of Lake Vener to the south of the Gulf of Bothnia. Copper, silver, lead, zinc, and a little coal are found. The forests are very valuable. They cover a greater proportion of the land in the north than in the south, and the usual processes of the lumbering industry are specially characteristic of the great rivers flowing into the Gulf of Bothnia, the trees being floated down them to saw-mills, and the produce exported from ports at their mouths. The forest products—timber, wood-pulp, &c.—represent half the total value of exports, while iron and steel, iron ore, machinery, and other manufactures of iron and steel represent nearly a quarter. Other large exports are butter, paper, and matches. Sweden carries on her commerce principally with the same countries as Norway, with Norway itself, and with France. The principal industrial towns are on the Sound and the Kattegat coast, from Malmö to Goteborg, and thence north-eastward (on and north of the great Lakes Vener and Vetter) to Stockholm. Water-power is used on a large scale, not only for saw-mills but for other works, as at the falls of Trolhättan. A waterway is provided through the industrial midland from Goteborg to Stockholm by the Göta Canal, Lake Vener, and other lakes. The midlands and south are well supplied with railways, Sweden having a greater railway mileage in proportion to population than any other European country. A northern line gives access to the northern iron mines; this line, being carried over the Norwegian frontier to Narvik on Ofoten fiord, is the most northerly in the world. The port of Narvik is open all the year, and the shipping of the iron ore from it is therefore not interrupted, as it is from the Swedish port of Luleå (pronounced Loolo) near the head of the Gulf of Bothnia, which is closed by ice during the winter half of the year. The principal Swedish seaports are Goteborg on the Kattegat, and Stockholm on the Baltic shore.

Denmark has a population exceeding 2½ millions. This is essentially an agricultural country; nearly three-quarters of its total area is agricultural land, and manufactures are small. Dairy-farming and poultry-farming are by far the most important branches. Over four-fifths of the total exports by value are of 'animal products', and two-fifths are of butter alone. Bacon and other meat and eggs are also exported in large quantities. Cereals, on the other hand, have to be imported in great amount. About three-fifths of the exports go to the United Kingdom; the bulk of the remaining trade is with Germany, Sweden, the United States, and Russia. Minerals are very scanty, and the trade in coal is wholly, and that in metals and manufactured goods nearly all, import. Copenhagen, the capital, on the Sound, is the chief port; the North Sea port of Esbjerg trades largely with Great Britain.

Russia has a population of about 150 millions, and some seven-eighths of them are occupied in agriculture. In *European Russia,* the tundra of the extreme north, as we have seen, is entirely unfit for agriculture. In the forest belt, southward to about 60° N., agriculture is difficult, on account not merely of the forest-covering but of the severe climate and of the inferiority of the soils (on the whole) in the north. Here, then, the working of the forest products, hunting and fishing are the principal occupations. South of 60° N. agriculture predominates. Reference has been made to the 'black-earth' region (p. 36); it is in the west of this region, that is the south-west of the country (Poltava, Podolia, Kiev), that agriculture is most prosperous. While the climate generally is continental in type, with great cold in winter and great heat in summer, there is found in the west a decided oceanic (Atlantic) influence, though its effects in reducing the extremes of heat and cold are weak in comparison with conditions in Western Europe. But in spite of this, and in spite of the vast north-and-south extent of Russia, the climate of all parts except the extreme north and south is decidedly uniform. Summer temperatures range up to 85° Fahrenheit even in Arkhangel; winter temperatures may range down to –20°, –30°, or still lower, anywhere except in the Black Sea districts. Of the total area, nearly two-fifths is under forest. Over a quarter is arable land. The cereals chiefly grown, in order, are rye, wheat, oats, and barley, but the order varies in different parts. Thus, in the northern forest-clearings, barley surpasses rye and oats; in Middle Russia rye is the principal crop; in most of the black-earth region, wheat. Beetroot in Poland and the south-west, flax and hemp in the centre and north-west, the vine in Caucasia, the Crimea, and Bessarabia, tea in Transcaucasia, are other more or less localized crops. Dairy and poultry-farming are increasing in importance. The southern steppes are especially noted for the breeding of sheep and horses.

The climatic conditions have a curious effect, indirectly, on manufactures. As agriculture becomes impossible during a long winter period, the people take to home industries; certain villages or districts become noted for certain particular manufactures, and at last factories for these special industries are established, improving the facilities for manufacture and distribution of the goods. But the people still go back to their agriculture in summer, and the factories stand idle. This arrangement is not, of course, universal, but is most characteristic of Central Russia. Among the principal industrial towns and districts (in the ordinary sense) are Lodz and the south-west of Poland, Warsaw, St. Petersburg, Riga on the Baltic, Odessa on the Black Sea. The textile and metal industries are the chief. For the latter an important district is Ekaterinoslav in South Russia, in which region coal and iron are worked. Coal, however, is of secondary importance to wood in Russia as a fuel for both domestic and industrial use. The minerals of the Ural region are more varied, but their working is less well developed; iron and a little coal are mined, together with nearly all the world's supply of platinum, some gold, &c. In Southern Poland coal, iron, and zinc are important, and in the Caucasian district are the great oilfields referred to above (p. 87). Their centre is the Caspian port of Baku. The oil is conveyed not only by rail and by steamers on the Caspian to the Volga, but also by pipes right across the Caucasian isthmus to the Black Sea port of Batum, over 500 miles from Baku. Manganese and copper, besides small amounts of other minerals, are obtained in the Caucasian region.

In *Asiatic Russia*, taken as a whole, agriculture is the chief occupation. There is no lack of minerals in some parts, but they are little developed. Gold, however, is worked in several districts—near Olekminsk (Yakutsk) in the Amur region, the Maritime Province, Nerchinsk and Transbaikalia, Mariinsk and Achinsk. Coal (especially in the frontier district of Turkestan near Kulja), iron, graphite, and rock-salt are known; petroleum in Ferghana; and silver-lead, copper, tin and various precious stones have been found in the Altai and Nerchinsk Mountains. Great mineral industries may be ultimately developed in Asiatic Russia, but in the meantime the exports to European Russia consist chiefly of grain, sheep, cattle, butter, and furs from Siberia; and of raw cotton (the cultivation of which is of growing importance), silk, cattle, and animal products from the irrigated agricultural lands and the pastoral steppes of the Turkestan territories.

The economic condition of Siberia may be contrasted with that of Canada. The two countries, as we find on viewing them regionally, are in many respects alike in physical conditions and products. But the development of Siberia is now at the stage through which that of Canada passed in the last generation. Over the vast areas away from the railway, means of communication, and commerce generally, are in a primitive state. Some believe, however, that with its agricultural and mineral resources, if the best use is made of them, Siberia may even surpass Canada in economic progress. In Canada the land is settled by immigrants of many nationalities; in Siberia this is permitted to none but Russians.

There are some 45,000 miles of railways in the Russian Empire; but there are more than three times as many miles of navigable waterways, some 50,000 miles of which are navigable by steamers. The chief waterways still equal, if not exceed, the majority of the railways in importance, and this even though they are icebound in the winter, for periods ranging from 77 days in the case of the Vistula at Warsaw and 90 days for the Lower Volga, up to 160 days or more for the rivers of the Arctic basin. In the winter they provide sleigh routes. In the summer navigation may be interrupted by drought. The low water-partings between the basins of the European rivers make canal-connexions easy to construct; moreover, it may be traced on a physical map how close together lie some of the headstreams of rivers belonging to the four basins—the Arctic, the Baltic, the Black Sea, and the Caspian. The great Siberian rivers, so far as concerns the main streams, provide generally north-and-south communications, and as (excepting the Amur) they flow into the Arctic Ocean their economic importance for external communication is small. But some of their tributaries provide communications east and west. Along the lines of these tributaries the country was originally opened up; subsequently a great road was carried from Perm by Tyumã, Tomsk, and Irkutsk to Stryetensk on a tributary of the Amur, and this route was approximately followed later by the Trans-Siberian railway, the main line of which, however, was continued through Manchuria and not along the Amur.

The chief Baltic seaports of European Russia are St. Petersburg (reached by a ship-canal from the Gulf of

Finland), with Reval and the Finnish port of Helsingfors on the same gulf, and Riga with its outport of Ust-Dvinsk at the mouth of the Western Dvina. Odessa is the largest Black Sea port, and has the heaviest export trade of all Russian ports, chiefly in grain. The chief Caspian port is Astrakhan; the chief Arctic port, Arkhangel; the chief Siberian port, Vladivostok. The last, however, has no hinterland capable of large commercial development.

The foreign commerce of Russia is small in comparison with West European countries, and considered relatively to its population. About half the exports by value are of cereals; timber and wooden wares, petroleum, eggs, flax, and butter follow. A variety of other animal products are also exported, while the fisheries, which are of the utmost importance in internal trade, provide among other things the characteristic export of caviare. Export trade is principally with Germany, the United Kingdom, the Netherlands, France, Italy, and other European lands. Imports are drawn chiefly from Germany (machinery, woollens, &c.), the United Kingdom (machinery and coal), and the United States, which supplies much of the raw cotton used in Russian manufactures.

CHAPTER XIII

CENTRAL EUROPE

Germany has a rapidly growing population of 65 millions. This is one of the three greatest industrial countries in the world, and as regards the supply of food to its vast population it occupies a mid-position between the other two, being not so completely dependent on imported food-stuffs as the United Kingdom is, but on the other hand nowhere near self-supporting, as is the United States. Agricultural land represents about two-thirds of the total area, and all the grains common in the West-European region are pretty generally distributed in Germany. Rye, oats, and barley predominate in the north and east, wheat in the south and west. The cultivation of beet for sugar is widespread, but two principal centres of the manufacture are Magdeburg and Frankfurt-on-the-Oder. The vine is grown principally in the Rhine, Main, Neckar, and Mosel valleys and adjacent territories. In the south hops are a characteristic crop; in the east, potatoes, both for food and for distilling. Cattle-rearing and dairy-farming are largely carried on, and there is a considerable export to England, especially from the lowlands bordering the North Sea—this territory, physically similar to Denmark, sharing its characteristic industry (p. 164). On the other hand, Germany as a whole is not self-supporting in these supplies, and imports them also. About a quarter of the total area is forested; the only large district actually deficient in timber is the western part of the great North German plain.

Maps of the relief of the land and the distribution of the population in Germany give a clue to the distribution of its chief industries. The most populous districts, broadly considered, form two converging belts or lines, which may be distinguished as the western and the eastern: (1) *The Western*, along the Rhine valley and certain tributaries, from Lake Constance downward. Here the most important districts are the Alsace flank of the Rhine valley itself and the parts of Hesse and Nassau about Mainz and Worms; to the east, in Württemberg, especially in the Neckar basin from Heilbronn to Canstatt and Stuttgart, and in Bavaria especially about Nuremberg and Würzburg (Main basin); to the west, in and about the valley of the Saar (Lorraine and southern Rhineland). (2) *The Eastern*, along the flanks of the hills which sink towards the North German plain. This second belt of very dense population is practically unbroken along the northward flanks of the Sudetic and Erz Mountains (in Silesia and near the Bohemian frontier), the Thuringian Forest, the Harz Mountains (Prussian Saxony, &c.), and thence westward to its convergence with the Rhine line in the greatest of all the industrial districts, that of Westphalia and the Rhineland, which lies mainly in and about the valleys of two right-bank tributaries to the Rhine itself—the Ruhr and the Wupper.

The Ruhr basin contains the chief German coalfield. In the vicinity are smaller fields, near Aachen to the south-west and Osnabrück and Minden to the north-east. A second great coalfield of the Rhine basin is that of the Saar, in the extreme south of the Rhineland, and Lorraine. The chief fields of the eastern line are those of Silesia, centring upon Beuthen and Waldenburg, and Saxony, east of Zwickau. Coal is also found in the Harz and elsewhere, and lignite in Prussian Saxony and Brandenburg. The chief iron-fields lie with the great coalfields, the Rhine-Westphalian, the Saar, and the Upper Silesian. Besides these minerals, there are found in the Westphalian district copper, lead, and quicksilver; in the Aachen district, and also in Nassau, silver and zinc, with the addition of lead in Nassau. Quicksilver also occurs in the Saar district. In the Harz district are found silver, lead, copper, nickel, and antimony; in the Erz mountains lead and cobalt; in the Silesian mining districts zinc, silver, and lead. Bavarian graphite is important. Salt is widely spread—in Prussian Saxony and Hanover, in Posen, in Württemberg and Bavaria and elsewhere.

In the iron and steel manufactures the Rhineland-Westphalian district leads. Here Essen and Bochum are the chief centres, while Solingen (p. 95) is noted for cutlery and hardware. The metal industries and mechanical works generally, however, are widespread; there are important centres in Lorraine and Alsace, in Württemberg and Bavaria, in the Saxon districts and elsewhere. The textile industries are similarly well-distributed. Cotton manufactures are chiefly identified with Chemnitz in the kingdom of Saxony, but Breslau in Silesia, Augsburg, Canstatt and other towns in Bavaria and Württemberg, Mülhausen and others in

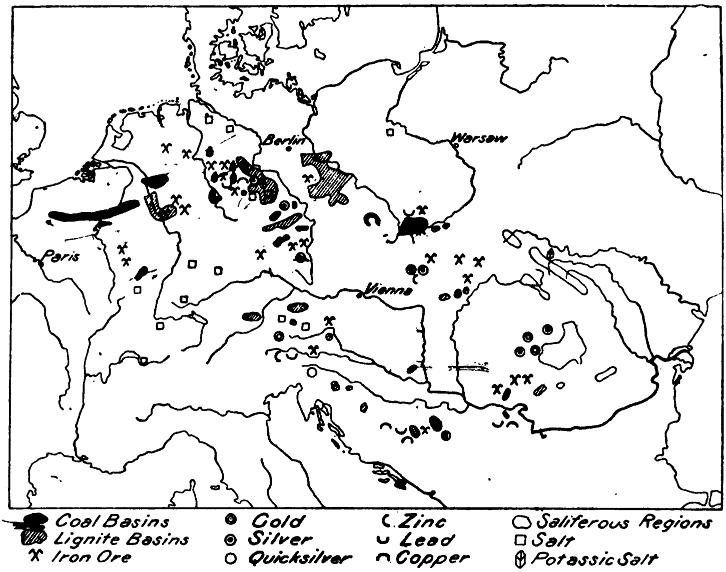

Fig. 33. Distribution of Minerals in Central Europe.

Alsace, Cologne and Düsseldorf in the Rhineland, have also important cotton industries. Elberfeld and Barmen on the Wupper have a great variety of textile industries; indeed, all the important industrial districts which have been mentioned have a share in one or some of them; moreover, in woollen and silk manufactures and those of carpets and jute goods Berlin and its neighbourhood take an important place. Chemnitz and Zwickau are the chief centres for hosiery; Krefeld for silk. The leather industries are most highly developed in Mainz and Worms, and the paper manufactures (a very widespread group of industries, yielding a large export) chiefly in the three districts of the Rhineland, Saxony, and Silesia, with Leipzig and Berlin. Certain districts and towns are specially noted for certain other manufactures, such as the Black Forest for clocks, Bavaria for toys, Nürnberg for pencils, Cologne for the perfume called eau de Cologne. On the whole, however, the specialization of a certain district in a certain great industry is not so clearly marked in Germany as in England.

Reference has been made in chap. viii to the chief seaports, and also to the German inland waterways (Fig. 14). The navigable rivers have a total length of 6,000 miles, and canals of 2,600. The Spree, on which Berlin stands, is connected by canals with the Elbe and the Oder navigations, and the Oder with the Vistula. In the north-east the Memel and the Pregel are united by canal, a route of value in connexion with the import of grain from Russia. The Main is connected from Bamberg with the Altmühl and Danube. From the Rhine there are connexions through Alsace and Lorraine with French rivers—the Doubs and Saône, and thence the Rhone; the Meuse; and the Marne, and thence the Seine. A canal northward from Dortmund connects the Westphalian industrial district with the Ems. The principal railway connexions with foreign countries are illustrated in Figs. 22 and 23.

The annual value of German exports is exceeded by that of imports, though not so greatly as in the case of the United Kingdom. In both cases the food imports turn the scale, but the proportion of food imports to total imports is larger in Germany than in the United Kingdom. The two principal single items of import into Germany are wheat and raw cotton, and the two countries with which Germany does greatest import trade are Russia and the United States. On the other hand, there is no leading group of exports of manufactured goods in which German exports do not exceed imports, and the two leading purchasers of German exports are the United Kingdom and Austria-Hungary. The principal single import into the United Kingdom is sugar. After Russia and the United States, Germany imports most largely from Austria-Hungary and Great Britain, France, Argentina, and British India. After Austria and Britain, Germany exports most largely to the United States, the Netherlands, France, Switzerland, Belgium, and Italy.

Holland and **Belgium** offer more contrasts than similarities. As regards agriculture, Holland has a larger area of cultivated land than Belgium; on the other hand, it has a much greater extent of waste heath land. In Belgium three times as much wheat is grown as in Holland, and twice as much oats; only the production of rye is roughly equal in both countries, being the leading grain crop. Both countries import wheat and other food-grains, but in Belgium (with a population of seven millions as against less than six millions in Holland) the excess of imports of cereals over exports is considerably less than in Holland. Holland, however, has nearly seven-tenths of its total area under pasture, and is noted for cattle-breeding. The Dutch are also famous market-gardeners and horticulturists; their cultivation of bulbs is especially characteristic. Their fisheries are important, and salt fish is exported. Another characteristic industry is the distilling of liqueurs, brandy, and gin at Schiedam and other places.

Holland has manufactures of cotton and jute goods in Overysel, and of woollens at Tilburg, Leiden, Utrecht and elsewhere. There is some coal in Dutch Limburg, but the mining and metal industries are small compared with those of Belgium, which possesses rich coalfields near Mons and Liége, and in Belgian Limburg, with important ironworks and manufactures (machinery, &c.), centring chiefly on Liége and Charleroi. Over one-eighth of the total value of the exports of home products is represented by iron, steel, and machinery, the most important items in that trade. The iron ore must be largely imported, as the local production has declined; but the adjoining independent Grand Duchy of *Luxemburg* is rich in it, and exports it both to Belgium and to Germany. Among other minerals, Belgium has a considerable production of zinc. In Flanders, with Ghent as the chief centre, there are textile and lace manufactures. Belgian flax is of fine quality. The Belgian industrial area practically forms one with that of Northern France (below).

Holland, whose low-lying lands depend for drainage upon canals, has a unique system of navigable waterways, which include the various branches of the mouths of the Rhine and Meuse. Possessing this system, the Dutch developed their railway system late and slowly. Even now Belgium, with over a thousand square miles less territory than Holland, has a thousand miles more of railways, and the same of light railways or tramways. Belgium also has an important but less complete waterway system, the principal rivers being the Scheldt and Meuse.

The chief Dutch ports are Rotterdam and Amsterdam; the former carries nearly seven-tenths of the total shipping trade of the country. It is approached by a ship-canal called the New Waterway, and has an outport at Hook of Holland, principally for passenger traffic with Harwich in England. Amsterdam is served by the North Sea Canal. Flushing stands at the mouth of the Western Scheldt. Terneuzen is at the entrance of a ship-canal to the Belgian inland port of Ghent; another such port is Bruges, served by a canal from Zeebrugge. The chief Belgian port and commercial centre, however, and one of the greatest in Europe, is Antwerp. The shipping trade of Ostend is chiefly with Dover and London.

Both Belgium and Holland, with their territories about the mouths of great European rivers, and together possessing a considerable part of the seaboard of the European marginal region with its vast commercial activities, have a large transit trade. The Belgian transit trade represents a quarter, by value, of the total foreign commerce of the country. Holland carries on over four-fifths of its export trade with Germany, the United Kingdom, and Belgium, and one-half with Germany alone. Imports come mainly from Germany, Russia, the Dutch colonies in the Malay Archipelago, the United Kingdom, the United States, and Belgium. Belgium, on the other hand, imports chiefly from France, with Germany, the United Kingdom, Russia and Argentina; exports are sent principally to Germany, France, the United Kingdom, Holland, and the United States.

France, with a population of thirty-nine millions, has a high proportion of cultivable land—nine-tenths of the total area—and the growth of wheat is sufficient for the population without import. The chief wheat-lands are found in the extreme north, in the basin of the Seine (especially its upper parts), in the country about the lower course of the Loire, and in that about the Upper Garonne. A belt of territory forming a curve between the Ardennes and the Pyrenees includes the majority of the great vine-growing districts, from that of Champagne in the north, through Burgundy (including the Côte d'Or and the Saône valley), by way of the Rhone valley and the Mediterranean seaboard west thereof to the Pyrenees, where the departments of Hérault and Aude are the most productive in France. In the west also, in Gironde (with Bordeaux as centre), in Charente, and about the lower course of the Loire, there are vineyards. France has a great range of fruits, from the famous cider-apples of the north-west to the oranges of the Mediterranean region. The sugar-beet is grown, and the sugar manufactured, principally in the northernmost departments (Aisne, Nord, &c.). The richer pastoral districts are in Normandy and the north generally, and in the western and west-central districts (Loire-Gironde); France has several famous breeds of cattle. The poorer upland pastures of the Pyrenees, the Landes, Britanny, the central plateau, the Alps, Vosges and Jura, support great flocks of sheep. French market-gardening and flower-farming reach a high standard. Snail-farms (for edible snails) are a characteristic branch of agriculture, notably in Burgundy. The extent of forests is not great—about one-fifth of the total area. The largest forests are in the

Vosges and Jura, and in the parts about Paris and Orleans. The fisheries are carried on chiefly from the ports of Britanny and the Pas-de-Calais. Fleets are sent to the Newfoundland banks, Iceland, and the Dogger Bank (North Sea). The north and west-coast fisheries supply herring and mackerel; the sardine fisheries and the canning of the fish are important occupations on the west coast, and in the Mediterranean there are anchovy and tunny fisheries.

The typical industrial district of France is that of the extreme north, bordering upon and geographically united with that of Belgium. Here are the chief coal-fields, supplying three-fifths of the coal raised in France; but coal has also to be imported. The same is true of iron ore, for which the chief home field (yielding over four-fifths of the total product), is near the borders of Luxemburg and Alsace, extending from Longwy to Nancy. Zinc and lead are the other minerals of main importance. The Pyrenean and Alpine districts, the central plateau, and the Vosges, all have numerous springs of mineral waters.

Pig-iron and steel are made chiefly in the Longwy-Nancy district and in the northern district (at Lille and neighbouring towns). Machinery and metal goods are produced in the latter district, and in the department of the Seine (environs of Paris), in and about Lyons and St. Etienne (Rhone, Upper Loire district), Chalon-sur-Saône and Le Creusot (Saône-et-Loire). There is a great textile industry, in cotton, woollens, linen, and other fabrics in the northern district (Lille, Roubaix, Tourcoing, &c.). The cotton industry is also established in Normandy at Rouen, Havre and elsewhere, and in the Vosges at and about Épinal and Belfort. The silk industry is hardly less important; its chief centres are in and near the Rhone valley from Lyons southward. Troyes is a centre for hosiery; Paris for millinery and dress; Limoges for porcelain, for which also the factory of Sèvres is famous. Without further detailing industries, we thus find the chief manufacturing districts to be localized near the north and north-east frontier, in the Seine valley (Paris, Rouen, Havre); and in or near the Saône-Rhone valley.

The principal commercial seaports are Marseilles, Havre, Dunkirk, and Bordeaux. Inland navigation is most highly developed in the industrial parts of the north and north-east—the Seine from Paris downwards, the Oise, the canals and rivers of Nord and Pas-de-Calais, the Marne and Meuse and their connexions with the Rhine. Waterways from the Loire, Seine, and Rhine to the Saône also carry a heavy traffic. A marked draw-back to the system is that the lower Rhone, from Lyons downward, does not provide a first-class waterway. In the west the lower Loire and tributaries furnish extensive waterways, and in the south the Garonne and the Canal du Midi make connexion between the Bay of Biscay and the Mediterranean. The railway system is simple. Five great systems radiate from Paris in a northern, eastern, southern (Paris-Lyons-Mediterranean), south-western (Orleans), and western direction. The Midi (Southern) serves the country south of Bordeaux and Toulouse, and provides the railway connexions with Spain by way of the coast-passes at each end of the Pyrenees (p. 131). The road system of France is particularly good and complete.

France is so far self-supporting in the matter of food-supplies that only a sixth of the import trade by value is in food products. Nearly two-thirds consist of raw materials. The leading exports are of textiles (especially cotton and silk goods), wool, wine, 'Paris goods', and a variety of other manufactures, among which motor vehicles take a prominent place. Both import and export trade are carried on principally with the United Kingdom. Next in order follow the United States, Germany, and Belgium for imports; and Belgium, Germany, and the United States for exports. Large trade is also carried on with Algeria among the French colonies, and with Argentina, British India, and Russia (all chiefly import), and Switzerland and Italy (chiefly export).

Switzerland. Of this mountainous land about three-quarters are reckoned as productive, but only a seventh of that area is suitable for grain-growing, and over four-fifths consist of pasture land. The greater proportion of grain is imported. Notwithstanding this, a third of the total population is engaged in agricultural and pastoral pursuits, in addition to those who work in forests, vineyards, and market-gardens. The proportion of pasture and arable land increases from west to east, being greatest in the north-east. The cattle are pastured in summer on the upper mountain meadows or 'alps'; in the winter they are brought down into the valleys and fed on hay which has been stored from the lower meadows. The mineral product of Switzerland most familiar in commerce is the asphalt of the Val de Travers. The chief manufacturing industries are textile, among which the silk industries occupy a third of the whole body of textile workers, and are concentrated in the north-east and north (Zürich, St. Gall, Appenzell, Basel). Embroidery is a characteristic branch. On the pastoral wealth of the country depend such manufactures as those of condensed milk and cheese; other food products exported are concentrated soups and chocolate. There are important mechanical industries in the same localities as the textile, while Geneva and the west are celebrated for watchmaking, and the same town for jewellery and goldsmith's work. A magnificent system of mountain roads has been developed; the railway system is also very complete, considering the nature of the country (cp. p. 130). The larger lakes provide important water communications. Switzerland imports mainly from her neighbours, Germany, France, Italy, Austria, and from the United Kingdom; her exports, to the extent of more than one-half, go to Germany, the United Kingdom, and France.

Austria-Hungary. On the broadest lines, it may be said that Austria is the manufacturing and Hungary the agricultural partner in this empire. Austria includes in Bohemia one of the chief European mining and manufacturing districts. Hungary has no manufacturing centres of the first rank save Budapest, but its plain provides some of the chief European wheat-lands.

Austria-Hungary covers an area of transition from cool to warm temperate conditions. Wheat and maize are the principal grain crops; but the range is wide in crops—even rice is grown in the Küstenland of the Adriatic—and in fruits, from the apples of Tirol to the figs and olives of Dalmatia. Vines are grown chiefly on the Hungarian mountain-slopes, on the Adriatic seaboard, in Styria, Lower Austria, and Moravia. Sugar-beet is largely cultivated in the Danubian plain and in Galicia. Hops, flax, hemp, and tobacco are important crops locally. The forests are valuable; about a third of the 'productive' land in Austria and a quarter in Hungary are covered with them, chiefly in the mountainous Alpine, Carpathian, and Transylvanian districts. The Alpine districts share in the characteristic Swiss pastoral occupations mentioned above, and Hungary is rich in livestock and especially noted for horses. In the Southern Tirol and Küstenland silkworms are reared and silk is spun. The fisheries, both sea and freshwater, are valuable; Bohemia is noted of old for fish-culture.

Coal is found in Bohemia, in the parts west of Prag; also in Silesia, Moravia, and the Hungarian uplands of the Carpathians. Lignite is abundant in Styria, and here, at Eisenerz, and in Carinthia, is abundance of iron ore. Salt (widely distributed, in Tirol, Salzburg, Galicia, and Transylvania), lead, zinc, graphite, copper, sulphur, and manganese are among other mineral products; gold is found in Transylvania, silver in West-central Bohemia and elsewhere, quicksilver at Idria in Carniola, petroleum and ozokerite on the Galician slopes of the Carpathians, and at Boryslav. The fine Hungarian opals are found in the Eperjes district of the Carpathians. Bohemia, and more particularly Northern Bohemia, is the chief industrial district, being separated only by a natural hill-frontier from the corresponding industrial districts of German Silesia, Saxony, and Bavaria (Fig. 10). Textile manufactures flourish in this area, at Reichenberg, Trautenau, Pilsen and other places, also in Silesia and Moravia, at Vienna (especially of silk), and in Vorarlberg (especially of cotton goods). The various metal industries are carried on both in Bohemia and in places near the Styrian and Carinthian iron-supply—Steyr, Graz, and Klagenfurt. The glass manufacture of Western Bohemia (with Eger as a centre) is one of the most important in the world.

The chief lines of communication through the Alpine districts are indicated in Figs. 22 and 23. Bohemia and the Hungarian plain are well supplied with railways, but there is not the same commercial necessity for numerous lines of communication over the Carpathian and Transylvanian passes, or through the mountainous territories of Bosnia, the Herzegovina, and Dalmatia, as there is in the Alpine districts and through the hills of the Bohemian frontier. Railway communications with the two chief ports on the Adriatic Sea—the Austrian Triest, the Hungarian Fiume—lie through difficult mountainous country and are of necessity somewhat tortuous and slow, and several good natural harbours on the Dalmatian seaboard, with its difficult mountainous hinterland, are little used. The whole course of the Danube within the empire is navigable for steamers, and some of its tributaries, as the Tisza (*Ger.* Theiss), Drave, and Save are also navigable for considerable distances. Bohemia has water communication with Germany and the North Sea by way of the Moldau (navigable for steamers from Prag, the capital) and the Elbe.

The leading exports are agricultural and pastoral products, sugar and eggs, wood and wooden goods; the products of the glass and woollen manufactures also stand high in the export trade. Raw cotton and wool, coal and machinery are leading imports. Two-fifths of the total trade is with Germany. Other leading countries from which imports are received are the United States, India, Russia, Italy. Others to which exports are mainly sent are the United Kingdom and Italy.

Servia, Romania, Bulgaria. Servia lies south of the Lower Save and the Danube, on the south-east frontier of Austro-Hungarian territory. Where the Danube leaves that territory on the east, its valley is narrowed between the closely-approaching mountains of Transylvania and the Balkan system, but its basin opens out again below, and it has Romania to the north and Bulgaria to the south of it. The products, especially the agricultural products, of all three countries are not unlike those of Hungary; in all wheat and maize are the chief grain crops. Romania far surpasses the other two in commercial development; as against Bulgaria, while the respective populations are under seven millions and four millions and a quarter, the value of Romanian trade is more than three times that of Bulgaria. Austria-Hungary, Germany, the United Kingdom, Belgium, and Turkey have leading shares in the trade with the three countries. Among various crops, Servia has a considerable export of prunes. The Romanian wheatfields, about the end of last century, were actually third in importance among those of the world, ranking only below those of the United States and Russia. Romania has also an important production of petroleum, but apart from this the mineral wealth of the three countries, which is considerable, is developed in only a small degree, if at all. All three export animal as well as agricultural produce. All have valuable forests, but only Romania exports much wood. A special export of Bulgaria is attar of roses. The three countries share in the important Danube navigation, and Romania and Bulgaria have each a seaboard on the Black Sea. Rumania has a well-developed railway system; Bulgaria's is less complete; Servia's is almost confined to a single trunk line, part of that which connects Bulgaria and Turkey with Western Europe.

CHAPTER XIV

THE EUROPEAN MEDITERRANEAN REGION

It has been found already that countries belonging to certain regions have similar agricultural products. In the European Mediterranean region the similarity extends further. Considering the principal countries which are wholly or mainly Mediterranean, we find that though agricultural products are of great variety, agricultural methods are generally backward. In the same way manufacturing industries are not as a rule nearly so highly developed as in the more northerly countries of Europe. And again, though some of the Mediterranean countries are well supplied with minerals, the mining industries are still capable of great development, which in some instances they only receive from foreigners, not from natives. The different degrees of commercial development in the five Mediterranean countries—Italy, Spain and Portugal, Greece and Turkey—are seen on observing the differences in the total value of import and export trade per head of the population. Judged by this test, Italy stands easily first in commerce; Greece, Portugal, and Spain group closely together; Turkey[1] ranks far behind, the value per head for Turkey being a quarter of that for Italy. The forests in some parts of the Mediterranean region are extensive and valuable, but in most countries the familiar story is told of the reckless cutting of timber and the deforestation of large tracts. Among the serious results of this process in Italy, Greece and elsewhere, is the tendency for water, when there is no longer any vegetation to retain it, to run off quickly from the steeper slopes, denuding them of rich soil and leaving them without any reserve of moisture in dry weather; while in wet weather floods are caused and marshes are formed in the flat low-lying plains.

---

[1] This proportion, and the average statistics on p. 222, will be affected by the loss of European territory to Turkey.

In **Spain and Portugal** about four-fifths of the total area are reckoned as productive, but the fertility of the soil differs very widely in different parts of the peninsula. In the eastern coast lands, especially Valencia, agriculture is most advanced. On the central plateau much of the land is unfertile, save in the north, in Castile and Leon, where some of the principal wheatfields are found, and in the south in the valley of the Guadalquivir. Irrigation is in many parts essential, especially to such crops as fruit and hemp. In Spain about one-tenth of the total area is irrigated, and some of the irrigation works are elaborate and highly successful. Wheat, barley, and maize are the most general grain crops. The vines, principally in the south, produce several well-known wines. The district of Jerez gives its name to sherry, and the districts of Malaga and Alicante, and in Portugal Oporto, are specially noted for their wines. The olive is grown chiefly in Seville and Cordova, oranges and lemons on the Mediteranean coast, the mulberry (for silk-worms) chiefly in Valencia. Esparto flourishes on dry lands in the south-east. Both sugar-beet and sugar-cane appear. The peninsula is not rich in forests as other parts of the Mediterranean region are: but a tree of economic importance is the cork oak, which grows both in Portugal and in Spain, chiefly in the southern provinces and in Catalonia. The peninsula is not especially rich in livestock, and practically as great an area is devoted to fruit cultivation as to grass. The mules and asses, however, are noted, and also the merino sheep, though the sheep-farming industry is less important than formerly.

Although Spanish minerals are by no means fully developed, the country is the richest of all in Europe in respect of the variety of minerals of which considerable quantities are produced. Coal is raised in Oviedo in the north, and in Cordova in the south; iron in the Biscay district in the north, and Murcia in the south-east. Copper is a product chiefly of Huelva in the south-west, where are the celebrated Rio Tinto mines; it is also found in the south of Portugal. Silver is worked in Almeria and Ciudad Real, lead in Murcia and Jaen, zinc in the north, quicksilver in Ciudad Real at Almaden. Portugal possesses iron, tin, lead, asphalte, asbestos, and sulphur, but mineral workings are very small.

The maritime provinces, conveniently situated for sea-traffic, contain the seats of the chief manufactures. The iron industries are established chiefly in the Biscayan districts, near supplies of iron ore and coal. Cotton goods are manufactured in Catalonia (Barcelona), and the northern provinces generally. The peninsula is served by a railway system of moderate extent, which is under the marked disadvantage, as far as concerns external trade, of having a different gauge from that of France and northern Europe generally. The trade of Spain, which is carried on mostly with the United Kingdom, France, the United States, and Germany, is chiefly, as regards exports, in minerals (especially iron ore), wine, sugar, fruit, and animal products, and cork. Portugal has a considerable export of fish, the Portuguese fishermen carrying on the tradition of the early prowess of the Portuguese as navigators. Barcelona is the chief Mediterranean port and commercial centre of Spain. Valencia, Alicante, Cartagena, and Malaga are other stations of the Mediterranean seaboard; on the southern Atlantic coast is Cadiz; on the northern (Biscayan), Bilbao and Santander. The chief Portuguese ports are Lisbon (the capital) and Oporto.

Italy. About seven-tenths of the total area of Italy is reckoned productive. Wheat and maize are the principal crops generally distributed. Rice is grown on low-lying moist lands. The manufacture of macaroni is characteristic, accompanying the grain cultivation, especially in the Neapolitan district. The distribution of the vine is general, but it is principally grown in the south. The olive is the characteristic tree of Italy, and it is estimated that one-thirtieth of the total area of the country is under olives, while on some parts of the Riviera one-third of the cultivated area is covered with this tree. In the north, however (Piedmont, Lombardy, and Venetia), it is of relatively little importance. The chief import of olive oil is carried on from Calabria and Apulia, though the best quality of oil is considered to be the Tuscan (Lucca). For oranges and lemons Sicily and the south of the peninsula are the principal districts; for the mulberry and silk, the three northern provinces. The forests consist chiefly of chestnuts at lower elevations, and above them pines, oaks, and other trees. The wood is much used as fuel, and deforestation has been serious, though in Italy, as in other countries, measures are now taken by the Government to prevent this and to restore the forests, with some degree of success. The dairying industry is chiefly developed in the north, and various forms of Italian cheese are well known in other countries. To the characteristic Mediterranean fisheries (tunny, sardine, anchovy) should be added that for sponges, and the working of coral. The Italian mainland is not well supplied with minerals, though some of its marbles are celebrated. The islands are better supplied in this respect; for example, Sicily has sulphur, Elba has iron, and Sardinia has zinc and lead.

Italian manufactures have reached a higher development than those of any other Mediterranean country. Coal is scarce, and an ample use is made of water-power. The most important manufacturing districts are those of the northern provinces of the Po basin, with Liguria and Tuscany. Among manufactures of machinery, for which there is a second centre in the Neapolitan district, special notice may be taken of the construction of motor cars. The textile industries have reached the stage of supplying a surplus for export. Chemical manufactures are important, and so are straw-plaiting and the manufacture of hats, especially in Tuscany; that province and the neighbourhood of Venice are noted for the manufacture of glass. Italian china, pottery, and mosaics, especially from Florence and Rome, are well known. The rapid development of industries in recent years has in certain instances suffered from inadequate railway service. The waterways of the Po basin are of importance. The trade of Italy is carried on principally with Germany, the United Kingdom, the United States and France, to which may be added (with particular reference to the destination of Italian exports) the adjacent country of Switzerland, and Argentina, where many Italian emigrants go. By far the most important export is silk, followed by cotton goods, hemp, fruit, wines, dairy produce, sulphur, olive oil, and many products of the metal industries. The imports are principally coal, wheat, raw cotton, and machinery. The chief of the numerous ports are Genoa (for the industries of the north especially) and Naples.

Greece and Turkey. Though Greece in its valleys and plains, and Turkey in many parts of its Asiatic territory, possess exceedingly fertile soils, agriculture is carried on by the most primitive methods. In Turkey, moreover, agriculture is heavily taxed, and in general there is little attempt at the production of surplus for export, though there are exceptions to this condition; thus, Turkish fields are among the chief sources of the supply of barley to the United Kingdom. An extension of irrigation would add to the productiveness of many districts in both countries; and in Asia Minor in the neighbourhood of Konia, and in Mesopotamia (where an ancient system of irrigation has been allowed, in the course of ages, to fall into disuse), important projects have been recently brought under consideration.

In Greece the most important product of the soil, as far as concerns export, is the vine which yields the currant, though this is limited in distribution to the western seaboard of the Peloponnesus, the southern shore of the Gulf of Corinth, Acarnania, and the western islands. The principal minerals are silver-bearing lead, for which the ancient mines at Laurium are famous, iron, and zinc. The country lacks coal and manufactures are few. But Greece, with a large proportion of coastline to its area, and many islands within its territory, is naturally the home of a seafaring population, who possess, moreover, strong commercial instincts, and take a prominent part in the trade of the Levant generally, having established trading communities in many towns within the Mediterranean and Black Sea area but outside their own territory. In relation to this geographical condition and the consequent development of sea-traffic, it may be noticed that the Grecian railway system is not connected with that of Europe generally. The Piraeus is the chief port, being adjacent to the capital, Athens.

In Turkey, opium, madder, and tobacco are important crops. Wine is produced in many parts; silk principally in Brusa and Ismid. Roses are cultivated for attar of roses, and endeavours have been made to establish cotton-growing on a considerable scale. Coffee and various fruits, figs especially, are among the more important exports, which also include silk, mohair (the hair of the Angora goat), and carpets, the manufacture of which is principally carried on in Anatolia. Minerals are known to be rich, but are little worked. Constantinople, with one of the most remarkable natural ports in the world, is also the capital of the empire; Smyrna is the chief port in Asia Minor, and Beirut on the Syrian coast.

In *Egypt* the industrial and commercial conditions differ from those of the rest of the Turkish empire, inasmuch as the country is in British occupation; and since this condition was established in 1882 Egyptian trade has largely developed. It is almost wholly dependent on agricultural produce, and agriculture is wholly dependent on the Nile for its water-supply. This is regulated by the great dam at Assuan and other works. In the Delta and in Middle Egypt generally, and to some extent in Upper Egypt, perennial irrigation is afforded by means of canals. In Upper Egypt, however, irrigation is for the most part not perennial, but is afforded by the annual flood and overflow of the river. The chief crops are divided naturally into summer crops, principally cotton, sugar, rice; flood or autumn crops, maize, millet, and rice; and winter crops, wheat, barley, and flax. There is also a considerable cultivation of vegetables. There are vineyards in Fayum, and the date, orange, citron, and fig are the chief among a variety of other fruits. Raw cotton represents four-fifths of the total export by value. Cotton-seed, sugar, beans, and cigarettes are among other leading exports. Two-fifths of the total trade is carried on with the United Kingdom; and France and Turkey principally in respect of the import trade, and Germany and France in that of the export, have the chief remaining shares. Port Said and Suez are terminal ports of the Suez Canal, but have an insignificant share in local trade compared with Alexandria, the leading port for Egyptian commerce.

Algeria and Tunisia. The French territory of Algeria carries on nearly five-sixths of its oversea trade with the mother country. The Tell, or coast region, is extremely fertile, and irrigation by artesian wells has been to some extent developed. Wine, sheep, wheat and barley, fruit and tobacco are exported, together with olive oil and esparto, which are special products of Tunisia, and cork. Minerals are various: the chief ore exported is iron. Large deposits of phosphates are known, in Tunisia especially; lead and zinc are also worked, and petroleum has been found in Oran. Algiers (the capital) and Oran are leading ports.

CHAPTER XV

NORTH AMERICA.

Canada and Newfoundland. The British North American territories have perhaps more interest for the inhabitants of the United Kingdom generally than any other of the great territories of the Empire, not only as the nearest to home, but also as receiving thence (at least till lately) four times as many emigrants yearly as the Australasian territories, and more than six times as many as the South African; while Canada is also the chief source, within the Empire, of the supply of wheat to the United Kingdom. Wheat and flour are the leading articles of export. The chief wheat-lands we have found to be in the prairies, and in a recent year over half the total yield has been from Saskatchewan, followed in order by Manitoba, Ontario, Alberta, and Quebec, the first, second, and fourth of these five being prairie provinces. The extension and development of communications westward and northward have carried with them a continual extension of the wheat-lands in the same direction; and it is found feasible to grow good crops of wheat as far north as the district of the Peace River, which has yet to be opened up by railway. Oats are grown on a still larger area than wheat, but principally in Ontario, followed by Saskatchewan and Manitoba; and of barley Ontario and Manitoba produce a practically equal amount, and are followed by Alberta. This last province, however, leads in the extent of its cattle ranches, and is followed by Saskatchewan and British Columbia. In the southern part of Ontario there is a notable fruit-farming district, where the vine and maize can also be grown, and British Columbia is no less celebrated for its fruit. The greatest extent of forests are found in British Columbia and Quebec. The most important products of the fisheries are salmon, lobster, cod, and herring. British Columbia has a large industry in catching and canning the salmon. Nova Scotia and New Brunswick are naturally the leading provinces for the eastern fisheries, and from Newfoundland dried cod represents seven-tenths of the total export.

The principal mining districts are found in Nova Scotia, British Columbia, Quebec, the north and west of Ontario, Alberta, and the Yukon district. Coal is found both in Nova Scotia and British Columbia (Nanaimo, &c.); but a considerable import is required. Silver and gold, nickel and copper are the principal metals in order of export value, silver being found in Ontario and in the western mountain districts, while in Ontario also is the chief nickel district in the world. Copper comes mainly from Rossland, British Columbia. Iron is found, but large quantities of ore are imported from the neighbouring districts of the United States. Rich iron ores are known in Newfoundland at Bell Island on the east coast, and also in the west. Six-sevenths of the manufacturing industries of Canada, reckoned by value of output, are carried on in Ontario and Quebec. Trade is carried on chiefly with the United Kingdom and the United States, in that order in respect of exports from Canada, but in the reverse order in respect of imports. A further considerable trade, mainly in respect of imports, is carried on with France, the West Indies, and Germany. The leading exports, in groups, after that of wheat and flour, are wood, wood-pulp and wooden ware; cheese, cattle and bacon; silver, gold and copper; fruits, and salmon, and among other exports furs should not be forgotten. It was the fur trade which originally opened up the country. Besides the two great St. Lawrence ports, Quebec and Montreal, Halifax is the principal Atlantic winter port, and St. John's, New Brunswick, is a rival to it. Toronto and Hamilton on Lake Ontario, Owen Sound and Parry Sound on Georgian Bay, Lake Superior, Fort William and Port Arthur at the west of the same lake, may be named among the Canadian lake ports. Vancouver is the leading Pacific port; Prince Rupert is the terminal port of the new Grand Trunk Pacific Railway.

United States. The commerce, industries, and communications of the United States have been so frequently referred to, by way of example, in preceding chapters, that little is necessary here beyond a survey of the chief products and industries according to localities. A comparison has been drawn (p. 97) between Western Europe, viewed regionally, and the States. To this it may be added that the United States, with an area not greatly less than three million square miles, is roughly equal to Europe less half of Russia; but the population of this European area is nearly four times as great as that of the States, which is ninety-two millions. There are parallels to be drawn between the great manufacturing industries in Europe and the States; but there is a strong contrast between the European agricultural districts, especially those of Eastern Europe, with their long-settled agricultural population, and the newly developed grain-growing and ranching lands of the Central and Western States (p. 39). Moreover, the European countries of the warm temperate (Mediterranean) region, viewed in the light of their history, have more or less descended in the commercial scale; and the southern part of the United States furnishes the type of commercial development at its highest point under modern conditions in warm temperate lands.

According to the leading agricultural products, the United States may be roughly divided into six districts. From New York north-eastward to Maine farming is of a mixed character, as in the adjacent part of Canada; and dairying is of leading importance in New York, as also in Wisconsin and Iowa. In Minnesota and the Dakotas is found the southward continuation of the great Canadian wheatfields: Minnesota leading among all the States in wheat production. A belt of States to the south, including Kansas, Indiana, Nebraska, and eastward to Pennsylvania and Virginia, is that in which maize becomes the prominent crop; though Kansas itself is second to Minnesota as a producer of wheat. Maize, however, occupies more than double the acreage of wheat in the United States at large; and on an average the principal producing States are Illinois, Iowa, and Nebraska. South of this belt is that in which cotton is the predominant crop. This includes all States from Oklahoma to North Carolina and south thereof. The inland mountain states of the west[1] include the arid lands where irrigation is generally necessary to agriculture, and this is being steadily developed. In the meantime livestock is of more importance; and wool is largely produced; but large flocks of sheep are also kept in the extreme Western States, and in Ohio, Michigan, and Indiana. For cattle the leading States are Texas and the chain of States extending north from it to South Dakota, together with Iowa, Missouri, and Illinois, which also have extensive cattle farms. For pigs the chief States are Iowa, Illinois, Indiana, Ohio and adjacent parts. The Pacific or extreme Western States, Washington, Oregon, and California, have a great extent of land available for grain, and are also noted for fruits, California being the leading State for grapes and the various subtropical fruits. In this State there is an important industry in canning fruit and also vegetables. The other principal fruit districts in the United States are in New York, Pennsylvania, and Ohio; and here, and also in Maryland, the canning industry is largely developed. Among other crops which are more or less strongly localized, the sugar-cane is grown almost exclusively in Louisiana, the sugar-beet in Colorado, Utah, and

---

[1] Idaho, Montana, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico.

California, and also in Michigan. Louisiana and Texas supply five-sixths of the total product of rice. Tobacco is grown principally in Kentucky, followed by North Carolina, Virginia, Ohio, and Tennessee. Washington leads in the timber industry ; but apart from this State the industry is most highly developed in the south, in Louisiana, Mississippi, North Carolina, Arkansas, and Virginia.

Most, but not all, of the great manufactures are carried on in the north-eastern districts, where the population has been long settled and where the principal Atlantic ports are easy of access. Raw cotton, besides forming the leading single article of export, also supplies large home industries. These are carried on largely in Massachusetts, where Fall River and Lowell are important centres, together with Manchester in New Hampshire ; but the industry has also been established nearer the source of supply of raw material, in North Carolina and adjacent States (p. 96). The manufacture of fabrics generally and of clothing, is also carried on in Massachusetts, together with New York, Pennsylvania, and neighbouring States. Thus Paterson in New Jersey and New York City are great centres of the silk industry. Knitted goods are made in Philadelphia, Cohoes, Amsterdam, Lowell, Utica, and elsewhere, and sometimes special products are very strictly localized. The manufactures of collars and cuffs at Troy, of gloves at Gloversville and Johnstown, and of boots and shoes at Brockton and Lynn, Massachusetts, are examples.

Iron and steel and their products rank next after raw cotton in export value, the export trade being mainly in the products, and not, as in the case of cotton, in the raw material. Minnesota produces half the total iron ore, followed by Michigan and Alabama ;

but, as we have seen, the iron is not smelted where it is found itself, but where coal is found—in Pennsylvania, especially at Pittsburg and adjacent towns (where natural gas provides another fuel of particular imporance in iron-smelting), in West Virginia and Ohio, and Illinois, which ranks second to Pennsylvania in coal output. In Alabama, however, on the south-western slopes of the Appalachians, both coal and iron are found, and here, in Birmingham and adjacent towns, important metal industries have grown up. Out of the iron and steel industry have developed many others, especially the mechanical industries, for which the United States is famous. American locomotives are exported largely to railways in other countries, especially in countries in the process of opening up; but they have even been tried on more than one English railway. Sewing machines, typewriters, and agricultural machinery are also among the more familiar products of American mechanical industries. The use of water-power in American manufactures should not be forgotten; although it has been to some extent superseded in certain industrial centres, its existence not infrequently determined their original establishment. The Falls of St. Anthony on the Mississippi have been an important factor in the flour-milling industry of Minneapolis; and among the manufacturing centres already mentioned, those more or less dependent on water-power include Lowell, Fall River, Paterson, Cohoes, and Troy.

A high place in the list of exports is, of course, taken by bread-stuffs, meat, and dairy produce. In addition to the industries already mentioned as associated with these products, there is that of meat-packing, which is carried on chiefly in Chicago, St. Louis, and a number of centres between the latter city and Omaha. Among exports next following in importance are mineral oils, copper and its manufactures (the principal of many metal manufactures apart from those of iron and steel), wood and its manufactures, leather and tobacco. The chief localities for copper-mining are South-eastern Arizona, Montana (where Butte is the centre), and the Keeweenaw Peninsula in Michigan. Among other minerals, gold is produced principally in Colorado, California, Nevada, and in the territory of Alaska: lead in South-west Missouri and South-east Kansas; zinc in Missouri to the extent of three-fifths of the total production, and also in Colorado, Wisconsin, Kansas, and New Jersey; silver in Colorado, Montana, Utah, and Idaho; mercury in California to the extent of seven-tenths of the total product, and also in Texas. From this it is clear that the western mountains are the principal source of metals generally, excepting iron, and the copper of the Lake Superior district (Michigan). Bauxite is produced chiefly in Arkansas. Among mineral products in which the United States occupies the leading position as producer, there may be mentioned tungsten, a metal of increasing utility in the manufacture of electric lamps, and also phosphates and gypsum; and in the production of sulphur, which is found almost wholly in Louisiana, the United States is second only to Sicily. (Communications and ports have been dealt with in chapter viii. Mexico will be considered along with the Central American Republics in chapter xviii.)

CHAPTER XVI

TEMPERATE LANDS OF THE SOUTHERN HEMISPHERE

THE principal countries which lie, wholly or in part, within the temperate region of the southern hemisphere are Argentina and Chile in South America, British South Africa, and Australia and New Zealand. If we consider these in three divisions, South American, African, and Australasian, a comparison is established which affords at once a contrast and a parallel. From the South American area the leading export is of agricultural (as distinct from animal) produce; from South Africa gold; from Australasia wool. It is noteworthy that these three great exports are roughly of the same annual value; at least the differences are small in proportion to the totals. But in exports generally Argentina-Chile take the lead. Australasia follows closely, while South Africa follows some distance behind. South Africa has few exports, apart from gold, which bulk very largely in value. Gold represents about three-fifths of the total, and gold and diamonds together something less than four-fifths, so that no great margin is left to be filled by such products as wool and ostrich feathers. The South American region, on the other hand, has a large export of meat and other animal produce from Argentina, and of nitrates and other minerals from Chile; while Australia and New Zealand, in addition to wool, provide meat and other animal produce, wheat, and flour, and a number of important metals, besides other products.

South America. Argentina furnishes an example of very rapid development as a food-supplying country under modern commercial conditions. Its farm lands do not, as in North America, lie in the interior, separated from the Atlantic highway by any tract of hilly or mountainous district; they are immediately accessible to the sea, and the estuary of the Plata forms a natural outlet. On this estuary are the Argentine ports of Buenos Aires (the capital) and La Plata, and the Uruguayan chief port of Montevideo. The agricultural lands, on which wheat, maize, and flax are the leading crops, and also the cattle ranches, lie mainly on either side of the Parana River and to the south-west of the Plata; but of the total area available for cultivation only between one-fifth and a quarter is actually cultivated, so that the future development of this territory may be very great. In the inland provinces, on the slopes of the Andes, vines are grown; and in the extreme north the sugar-cane. The neighbouring republics of Uruguay and Paraguay share in the wealth of Argentina in cattle. The exports of agricultural produce and of animal produce, the latter of which includes large quantities of frozen and preserved meats, make together six-sevenths of the total exports.

It may be said that Argentina is the agricultural and pastoral, and Chile the mining division of this South American area. It is true that Chile still produces wheat for export, and that the cultivation of barley, maize, the vine and many fruits is important; but great changes have taken place since Chile actually exported wheat to Argentina, and also supplied the Pacific coast lands to the north as far as California. The nitrates, which make up two-thirds of the exports from Chile, and the minerals generally, which include copper, coal, borax, gold, silver, and sulphur, are obtained principally in the northern provinces. Wheat ranks after nitrate and copper among the exports, and is followed by iodine. The United Kingdom has considerably the largest share of the export and import trade of these countries. The other European countries which have a considerable share are Germany, France, Italy, and Belgium, while the United States, the products of which are similar, has in consequence no great import trade from South America, but exports manufactured goods thither. Valparaiso is the leading port, not only of Chile, but of the whole South American Pacific coast.

South Africa. The Cape of Good Hope and the Transvaal are the principal commercial partners in the Union of South Africa. In the Cape Province are the famous diamond mines of Kimberley. Among the other products of the province are wool, mohair, ostrich feathers, and butter, the country being, as elsewhere in South Africa, rather pastoral than agricultural. In the Transvaal are the goldfields of the Rand, the richest in the world. Both provinces, and also Natal and the Orange River, possess coalfields. Diamonds are found not only in the Cape province, but also in the Transvaal in the Johannesburg district. Gold is not confined to the Rand fields, but occurs elsewhere in the Transvaal and in Natal, and various other minerals are either worked to a minor extent or at least known to exist.

The greater part of South African lands need irrigation if agriculture is to prosper, and irrigation has not been seriously undertaken until recent years, nor has it as yet been very widely extended, but the agricultural possibilities of the territory are undoubted, and such crops as wheat and various fruits are increasing in importance. Tobacco is cultivated in the Transvaal and the Cape, sugar and tea in Natal and in Portuguese East African territory to the north. The United Kingdom takes the great bulk of British South African exports, but Australia, New Zealand, Germany, the United States, and Canada have a considerable share in the trade. Cape Town, Port Elizabeth, and Durban are leading ports.

Australia and New Zealand. The Great Dividing Range of Australia, running parallel to the south-east and east coast, and at no great distance from it, intercepts the easterly rain-bearing winds; and the plateaus and plains become drier as the distance from the sea increases, until they merge into desert. Natural pasture land, however, may be said to extend in the east from the Dividing Range to about the meridian of 145° E., in addition to similar tracts in the south and the west. Over much of these tracts natural grasses provide good food for sheep and cattle, and even where they fail through drought, the saltbush and other vegetation serve the same purpose. The Australian wheat-lands are principally in Victoria, South Australia, and New South Wales. The yield, under present conditions, is not high, as usual where cultivation is in process of development over a wide area, as the farmers rely simply on the natural productiveness of the soil, without much attention to scientific cultivation. Irrigation has been developed, principally in the valley of the Murray River. In the north-east, towards and within the hot region, maize and sugar-cane become important crops. The vine flourishes principally in South Australia, Victoria, and New South Wales; and Australian wines have become well known in England and elsewhere. Fruits include oranges, pineapples, bananas, and apples. The valuable timber is obtained from the coastal belt in New South Wales, Queensland, and parts of Western Australia, and from Tasmania.

Gold is found in all the States. In Western Australia the rich fields are principally in the south and inland, including the fields of Coolgardie, Kalgoorlie, and Murchison. In Victoria the principal fields are in the district of Bendigo and Ballarat. Silver is also found in all the States; but the greatest proportion of it is obtained in New South Wales near the western frontier in the fields of Broken Hill and Silverton. Tasmania leads in the production of copper and tin; but there are also important copper mines in the Cobar district of New South Wales, and in South Australia at Moonta, between the Spencer and St. Vincent Gulfs, and also at Burra Burra. Tin is also mined on the borders of New South Wales and Queensland. Iron ores are widely distributed, but their development is only at an early stage. Coal is found in all the States; in New South Wales principally in the fields at Newcastle, and in the Illawarra district, respectively north and south of Sydney. A variety of gem stones are found, but have given rise to no important workings, with the possible exception of diamonds, the best of which are small, and opals.

The physical character of Australia, making as it does for settlement principally on or within no great distance of the coast, naturally makes also for importance of sea communications. This feature may be connected with the fact that the railway system has developed, as may be said, locally. The trunk lines are not of the same gauge throughout, nor has any transcontinental line been completed; though one is building, and others are contemplated. Commerce with Australia is in very large proportion British. Of the exports, over two-thirds go to the United Kingdom and British possessions, and over three-fourths of the imports come from the same. Between Australia and New Zealand there is a strong similarity of leading products for export. Besides wool, the chief in both countries, meat and other animal produce, and among metals gold, have the prominent positions. To those of Australia must be added wheat and flour, copper, silver, and tin. Leading centres of trade are Perth in Western Australia, Adelaide in South Australia, Melbourne in Victoria, Sydney in New South Wales, Brisbane in Queensland, Hobart in Tasmania, Wellington, Auckland, Christchurch, and Dunedin in New Zealand.

CHAPTER XVII

THE MONSOONAL AND OTHER ASIATIC TERRITORIES

India. It has been said that 'the cultivation of the soil is the occupation of the Indian people in a sense which is difficult to realize in England.' The same may be said of Asiatic monsoon lands in general. Two-thirds of the population of India is exclusively concerned with agriculture. No other single occupation claims more than one-sixteenth, and the majority of the industries are subsidiary to agriculture and its products. 'Even in considerable towns, the traders and handicraftsmen almost always possess plots of land of their own, on which they raise sufficient grain to suppy their families with food.' This complete dependence on agriculture is not wholly a favourable feature in a land where the crops are dependent on a rainfall which is liable to failure, and in the record of famines India stands preeminent. China is at times similarly affected.

The principal exports are cotton (raw and manufactured), jute, seeds (mainly oil seeds), rice, wheat, and tea. The export of cotton comes mainly from Bombay, where it is grown on the plains of Gujarat and Kathiawar. It is also a leading crop on the uplands of the Deccan, and in the valleys of the Central Provinces and Berar. Cotton mills have been established principally in the Bombay Presidency. Labour is cheap, but in comparison with that in the great manufacturing districts of Europe and North America it is far from efficient. Moreover, neither this industry, nor any other in India, has been organized in factories in the same way as in Western Europe or North America, and in this respect the population of India may be compared with the case of Central Russia, already quoted, as one with which agriculture, as may be said, is a first instinct, and whose industries have been developed mainly in the homes of the people, and not in factories. Factory workers in India number hardly one-sixteenth of home workers.

The cultivation of jute is carried on for the most part in Bengal and Assam, and jute mills have been established in the neighbourhood of Calcutta. This crop and the accompanying industry increase in importance as the demand for sacks for the export of many products, such as Australian wool, wheat, &c., increases. Oil seeds are cultivated throughout India, the surplus for export coming mainly from Bombay and Sind. Rice is the characteristic crop of the great deltas and the narrow coastal belt of the west; but in respect of exports Burma takes the lead, and in the case of failure of the crop and famine in India, Burma is drawn upon to supply the deficiency. The rice export, it may be added, is shared by Siam, where it forms six-sevenths of the total exports by value; and by French Indo-China, where it forms one-half. Over one-third of the total acreage under wheat in India is in the Punjab, where a notable system of irrigation by canals has been carried out. Of the export of tea, nine-tenths comes from Assam and Eastern Bengal, and tea is also the principal export of Ceylon. The millets, taken together, form the most extensive crop throughout India, except in the districts especially devoted to rice; but these grains, which may be reckoned (speaking generally) the principal food products for home consumption, do not enter into commerce. There is a great variety of vegetables and fruits; spices are characteristic for use in curry and other dishes. Pepper is grown on the Malabar coast; coffee on the landward slope of the Western Ghats, in Coorg and parts of Mysore; indigo mainly in Bengal, with other dye-stuffs; opium in Bengal and Bombay; cinchona in Coorg and the Nilgiri Hills, and the neighbourhood of Darjiling, and lac—these may be also quoted among leading products. In the commercial exploitation of the forests Burma takes the lead with its valuable teak; this timber is also obtained from the low-lying forests of the Western Ghats and those of the Satpura and Vindhya hills. The sandal-wood of the Ghats in Coorg and Mysore is also valuable. The chief Himalayan timbers are coniferous, and include the deodar.

Coal has a wide range in India: the most important workings being at Raniganj. Indian coal is used on the railways and shipped to the East, but the development of manufacturing industries is not such as to cause a great demand for it. Rich iron ores are known in many parts; in the neighbourhood of Raniganj and elsewhere they accompany coal. They have long been, and still are, worked to a considerable extent by native methods, but with few exceptions deposits have not been developed on commercial lines. Among other minerals of some importance are the gold of Kolar in Mysore and the manganese of Madras, while in Burma important workings have been developed for petroleum, and tin, rubies, and jade are also found. The metal manufactures of India are mainly of artistic interest, the brass and copper ware of Benares being specially famous. The pottery of Sind has a similar reputation, and so has the industry of carpet-making, which has superseded the manufacture of Kashmir shawls. Imports into India are drawn from the United Kingdom to the extent of about three-fifths of the total. Indian exports are sent to the United Kingdom to the extent of about one-quarter, as China, Germany, the United States, Japan, France, and Belgium have all a considerable import trade from India, which is not balanced by exports thither. Bombay and Karachi on the west, Calcutta and Madras on the east, are leading ports.

China. In the northern part of China agriculture is favoured by the extremely fertile loess soil, so long as there is no failure of rainfall, for loess is extremely porous and does not retain moisture during a drought. The products, however, are chiefly cereals, the export of which is prohibited. Towards the central provinces, however, that is to say, roughly, south of the Hwang-Ho and its tributary the Wei-Ho, the leading crops become tea and cotton, besides rice; and both tea and cotton have an important place in the exports of China. The largest production of tea is from an area which covers parts of the provinces of Chekiang, Fukien, and Kiangsi. The cultivation also extends into the provinces adjacent to this district on the north and west, and there are further considerable tea plantations in the south-west. Rice is more widely cultivated than any other plant. The Chinese pay great attention to the cultivation of fruit, and are also accomplished gardeners.

The mulberry tree is in a sense the most important economic vegetable product of China, for the rearing of the silk-worm, which feeds upon its leaves, supplies the industry which provides one-quarter of the total export trade of China by value. The silk is exported both raw and manufactured, the principal manufacturing centres being Suchow, Nanking, and Hangchow. Cotton-spinning and weaving factories have been established by foreign companies at Shanghai, but the native industry is almost wholly carried on in the homes. The porcelain manufactures of China are famous, and among the various provinces where they are carried on that of Kiangsi may be specially mentioned. Lesser industries include the manufacture of lacquer ware, matting, fans, furniture, and Indian ink.

It has already been observed that China is extremely rich in minerals, but that there have been difficulties in the way of their development (p. 84). Coal and iron are very widely distributed. Copper is chiefly found in Kweichow and Yunnan, and tin also in Yunnan; this last being the most important metal as far as concerns export trade under present conditions. The variety of minerals besides these is undoubtedly great.

Japan. The Japanese stand alone as an oriental people who have of their own will adopted a commercial and industrial system on European and American methods, and have proved themselves capable of competing on equal terms with those from whom they have learned. They carry on their trade principally with the United States, whence they import much less than they export thither, the same being true of China and France; whereas they import more from India, Germany, the United Kingdom, and the Dutch East Indies than they export to those countries. The staple food-grain of Japan is rice, and the national drink called saké is distilled from it. The rice-lands, known as paddy fields, occupy rather less than half the total cultivated area, and fill the valleys with small fields, carefully embanked and irrigated. Barley, rye, beans, and wheat are the other more important crops. The Japanese islands are generally mountainous or hilly, and three-fifths of the total area is covered with forest. The forests have not been largely developed on commercial lines; on the other hand a system of forest conservation has been established, so that in view of the increasing demand for wood and other forest products, Japanese forests may in the future be found to be in a better condition than many others. Silk and its manufactures make up some three-eighths of the total exports by value. The production of silk is widely distributed, but is carried on chiefly in the main island of Hondo, the principal manufacturing centre being Kioto. Tea supplies a large consumption at home, but with the exception of the United States has no foreign markets of first importance. Among other products may be mentioned camphor, the lacquer tree (which supplies the material for lacquer ware, a well-known Japanese manufacture), vegetable wax, and tobacco. From the point of view of exports, the most important mineral is copper: some gold and silver are worked, and there are large deposits of coal, which supply a considerable export trade, and have become of first-rate importance to the growing manufacturing industries of the country. In the same connexion, the ample supply of water-power is put to increasing use. The coal-supplies include anthracite in the island of Amakusa, and brown coal in Kiushiu and Yezo. Petroleum is found in the west midland of the island of Hondo. The Japanese employers are able to command a large supply of cheap and efficient labour. Various textile industries have been considerably developed, especially the cotton manufactures. The area devoted to cotton-growing has shown some decline; and the manufacturers have to draw upon foreign sources. A large manufacture of matches has been built up. Among other characteristic manufactures mention may be made of porcelain, earthenware, straw-plait (an industry shared with China), and matting. Foreign commerce is carried on principally through the ports of Yokohama, Kobé, and Osaka.

The **Malay Archipelago** is noted for such products as sugar, coffee and tea, sago rice, spices and fruits, tobacco, and rubber and other forest products. Among the Dutch Malay islands (Netherlands-India) Java is so far of leading importance that the others are known collectively as the Outposts. They possess coal, not only in Java but in Sumatra and Borneo, and important tin-workings in Banka, Billiton, and Riouw. In the British territories in Borneo, coal and iron, gold and oil, are known. A characteristic product of the archipelago is the edible nests of birds, which are in favour with the Chinese. Singapore, the principal of the Straits Settlements, is also the chief trading centre for the archipelago, and for the Federated Malay States.

South-western Asia. The countries of South-western Asia present various difficulties in the way of commercial expansion. In Persia, for example, communications are bad, and the climatic conditions generally necessitate irrigation on a large scale, if the full productive power of the land is to be availed of, but under indifferent government such developments have not been undertaken. In Sistan in Eastern Persia and Afghanistan is found a district, which in former ages was far more productive under an effective irrigation system than it is now, since that system has not been maintained. The same condition is found in a degree still more marked elsewhere in South-western Asia. Thus the Tigris and Euphrates valleys have been in the past the home of powerful communities, far advanced in civilization, such as those of Assyria and Babylonia, and others of later periods. In South-western Arabia, again, ruins of great irrigation works are found in Hadramut and Yemen. The latter territory possesses a moderate rainfall, and is still the most productive part of Arabia, specially noted for its coffee

Persia, however, even under existing conditions, is by no means unproductive as a whole. Its chief agricultural products entering into commerce are fruits, cotton, opium, and rice; wheat, barley, and tobacco are also produced in considerable quantities, and silk, gums, and wool are among the more important exports. In connexion with the production of cotton, silk, and wool, there is some amount of manufacturing industry, though attempts to establish manufactures on European lines are marked by many failures and few successes. The principal native manufacture for export is that of handmade carpets, and Persian workmen have long been noted for the fine quality of their work in many branches of ornamental art. The cultivation of tea has been undertaken. Foreign mining experts have been tempted to face great difficulties in the effort to deal with the undoubted mineral wealth of the country. Lead, copper, and iron are widely distributed; tin is known in the north-west, as are nickel, cobalt and other metals elsewhere; while in the south-east, far removed from conditions favourable for their working, are rich seams of coal. Oil has been proved in the western frontier districts and in the north. In addition to the pearl fisheries in the Persian Gulf there are turquoise mines of some value in the neighbourhood of Nishapur. Save for less than a thousand miles of fair road, trade must be carried on over more or less difficult tracks. The trade of Afghanistan and Baluchistan suffers under difficulties similar to those in Persia

CHAPTER XVIII

THE HOT LANDS IN AFRICA AND AMERICA—PACIFIC ISLANDS

AFRICA in the early stages of its exploration offered little obvious attraction to traders, and set many obstacles in their way. With the exception of the north and south, with which we have already dealt, communication with the interior is difficult. The rivers do not offer uninterrupted highways from their mouths inland, and the tropical forest adds to the difficulty of penetrating and opening up the country. The coast lands are only now being rendered less unhealthy than they have been to white men, especially by the destruction of the mosquito which has been found to introduce the germs of malarial fever into man. This discovery and the application of principles and practices suggested by it have in a brief time greatly improved the conditions of life in tropical countries for the natives of temperate ones, and its indirect effect on the commercial development of tropical and warm temperate lands will be very great. Not only the spread of malaria, but also that of yellow fever, a scourge of the West Indies and the central parts of South America, has been traced to the mosquito, and these discoveries and others have made possible, incidentally, the construction of the Panama Canal without severe loss of life. The natives of Africa do not, as a rule, possess strong commercial inclinations or ability, and their intercourse with traders from without has been in many cases the reverse of friendly as a result of the traffic in slaves, which until very recent times was carried on in many parts with many accompanying horrors.

The forests products take precedence among the products of the African hot lands. Chief of these are rubber and palm oil. The various rubber plants are distributed throughout the hot forest lands. Palm oil is not drawn from such widespread sources: it is a production mainly of West Africa, and especially of the coast lands about the inner part of the Gulf of Guinea. The tropical forests fringe the coast of that gulf, extending inland in a deep belt, and have their principal extension elsewhere in the basin of the Congo. For this reason the other forest products are characteristic mainly of the west-central territories. Such are timbers, both for building and ornamental uses, dyewoods, and various gums and resins. The cultivated products are in many cases scarcely advanced beyond the experimental stage of cultivation. Little cotton is grown outside Egypt, but it has been successful in the Anglo-Egyptian Sudan and elsewhere. For coffee Abyssinia is noted, though the product is small. There are also coffee plantations in Nyasaland, in German East Africa and Kamerun, in Belgian Congo, and in Angola. Ground-nuts are exported, especially from the west. Pemba and Zanzibar are noted for their cloves; cocoa is cultivated in the Gold Coast, Kamerun, and elsewhere. Dates are the characteristic product of the oases of the northern deserts; sugar is a crop confined mainly to various islands adjacent to Africa, notably Mauritius and Réunion. Among animal products may be mentioned the ivory of the Belgian Congo and other parts; hides, which are an export of considerable value from Abyssinia and Somaliland; and ostrich feathers, some supply of which is obtained from the open country between the Sahara and the central forests, in addition to the much larger supplies from South Africa. Beeswax is collected in West Africa and Madagascar especially. The mineral production outside South Africa is very small, with the exception of that of the Katanga district of Belgian Congo, which borders Northern Rhodesia: here is great wealth of copper, which has been developed to a considerable extent by British enterprise; and gold, iron, and tin are also obtained. Copper is also found in German South-west Africa; gold, in addition to fields in Rhodesia, is obtained to a small amount, which is expected to increase, in the Gold Coast: both these metals are known in the Anglo-Egyptian Sudan.

Railway communication has not been developed in any part of the hot lands to any such degree as in Algeria or South Africa, but in West Africa communications between several points on the coast and in the hinterland have been established, and the banks of the Upper Niger and the Upper Senegal have been connected by a French line. With the lines avoiding difficulties of navigation on the Congo we have dealt in an earlier chapter (viii). The railway connexion between the Cape and South African system and Cairo and the Egyptian has never been completed, but the British railway system from the south has penetrated Rhodesia, and that from the north (Egypt) the Anglo-Egyptian Sudan, while the territory last named has also been given access by railway to the

Red Sea at Port Sudan. In East Africa the most notable railway is perhaps that known as the Uganda, connecting Lake Victoria with Mombasa. The majority of the colonizing powers have effected material improvement in African communications, not only by the construction of railways, for the extension of which there are continual demands, but by the use of the natural waterways, and also in some parts by the extension of roads. The French have constructed considerable lengths of good roads in Madagascar; the Germans have done the same in their East African territory and Kamerun; while the so-called Stevenson Road, between the north end of Lake Nyasa and the south end of Lake Tanganyika, may be mentioned as an example of British construction. The tendency is thus to supersede the native trackways, which run often for great distances from the coast to the interior, and still are used by native porters. It may be observed in this connexion that the native traders of the Central and Western Sudan, south of the Sahara, carry on their commerce by routes across that desert to the countries of the Mediterranean seaboard, rather than attempt to penetrate the forests of the Guinea coast hinterland and the northern parts of the Congo basin.

SOUTH AND CENTRAL AMERICA.

The commercial development of South America is attracting wide interest, both in Europe and North America. Not only politically, but also geographically, conditions affecting commerce in the hot lands of South America are very different from those in the hot lands of Africa. The continent of South America has its long slope from the summit of the western mountains towards the Atlantic, and the countries of this eastern slope, with one exception, are easily accessible from the coast; even the tropical forest region is penetrated by the great system of waterways of the Amazon and its tributaries. The western mountains are in many parts rich in minerals. In South America the political conditions are not those of a division of the land between colonizing powers; instead, out of the original colonial settlements there have developed a number of independent States, with a resulting tendency towards wider commercial relations, in spite of the fact that most of these States have passed through periods of internal trouble—revolutions, difficulties of finance, and so forth—a condition from which not all of them have yet escaped.

The largest of the South American republics is Brazil. It is in the south-east that the principal commercial development of this republic has, so far, taken place. In that region are the coffee plantations, which supply the commodity forming half the total exports of the country by value. The second on the list, representing not much more than one-third by value, is rubber, and this is produced in the northern territories, from the forests of the Amazon basin. Attempts have been made to extend the cultivation of wheat, characteristic of the neighbouring territory of Argentina, into the southern part of Brazil. This has not been successful, for, except in the cities, there is no great demand for wheat or other flour, as the manioc is the principal food-plant in the country generally. The other characteristic occupation of Argentina, however, cattle-raising, extends over the southern territory of Brazil, and as far north as Matto Grosso. It has also been carried on, with less success, in certain more northerly upland territories, as in Piauhy. Hides and skins stand high in the list of exports; but, on the other hand, meat is largely imported from Argentina and Uruguay. It may be added here that the valuable fisheries are also not so far developed as they might be. Among crops other than coffee, maté, or Paraguayan tea, is exported, as also is cocoa, the cultivation of which is carried on in the coast States from Bahia northward to the Amazon; tobacco, the cultivation of which is widely distributed; sugar, for which the central coastal territories are the most important, and cotton. Brazilian fruits (among which Brazil nuts are familiar) have a wide range and variety, and the trade in them is believed to be capable of great extension. The same would appear to be true of minerals; though the country has long been noted for diamonds and gold, the production of neither is very large. Brazil is specially noted for monazite, a mineral found in river gravel and sea-sands, which enters into the manufacture of incandescent gas mantles. A variety of manufacturing industries, principally textile, are being developed at Rio de Janeiro and other large towns. The settlement and development of the coast regions in distinction from the interior is due to the obstruction of communications by the escarpments which separate the interior plateau from the coast lands. From this cause railway development has been difficult, and no railway extends inland for more than some 400 miles.

In the remaining States and territories of South and Central America a strong similarity is to be observed in the natural products, though they have been developed in different States in different degrees. The British, French, and Dutch territories of Guiana yield sugar, a familiar variety of which is named from Demerara in British Guiana; and also cocoa, rice, coffee, and bananas, together with various forest products; while all three colonies produce gold. The two northern republics, Venezuela and Colombia, produce coffee, a characteristic product also of the Andean territories, but more especially of the Central American republics. Rubber is a product of growing importance in the forests of the eastern slopes. All the republics are rich in minerals, though the degree of development varies greatly. In Bolivia, with the exception of rubber, the exports are almost wholly mineral, tin, silver, copper, and bismuth being the chief. Peru is most famous for its silver, and also produces gold and copper, and is known to possess a great variety of other minerals; as also is Ecuador, where none is much worked. Colombia and Venezuela both yield some gold, and the minerals of present economic importance in Colombia also include silver and platinum, besides coal and iron, which are worked and support manfactures of some importance in the neighbourhood of the capital, Bogotá. Among the agricultural products not already named cocoa is common to most of the republics, and is the staple product of Ecuador; sugar is a valuable crop of the coast lands of Peru. The pastoral districts of Venezuela are less important than formerly in respect of the export of hides and cattle. Ecuador is noted for the manufacture of the straw hats known by the name of Panama. Of the Central American republics coffee is the staple product; in Guatemala, for example, it represents nearly seven-tenths of the exports by value. The banana is the chief among exported fruits. Rubber and other forest products are of some importance in Nicaragua and elsewhere. Important mineral deposits are known in various parts of the isthmus, but are in an early stage of development. Mexico is reckoned geographically with North America. Its minerals have been long developed, and the production of silver, gold, and copper is of high importance. Among cultivated products, coffee again takes a high place in the export trade, as also does sisal hemp or henequen. The majority of cultivated products, however, supply little more than home consumption; such as maize, wheat, and tobacco, and also cotton, in connexion with which there is a considerable manufacturing industry.

In the West Indies, in contrast with the mainland, the mineral wealth is not generally great, though asphalt and oil are important in Trinidad, and iron promises to become so in Cuba. The characteristic tropical products which have been mentioned above mostly appear in the West Indies, but are not as a rule generally distributed through them, with the exception of sugar. Thus Jamaica is chiefly noted for bananas and oranges, Montserrat and neighbouring islands for limes, the Bahamas for pineapples, and so on. Cocoa is cultivated in Grenada, Trinidad, and other islands. Cotton has been introduced into St. Vincent, Antigua, and other islands with success. Spices are a characteristic product of the islands, and the cultivation of rubber has been tried with promise. To the localized products may be added the arrowroot of St. Vincent, the sponges of the Bahamas, and Jamaica rum. The West Indies have suffered in a more marked degree than any other division of the world whose commerce is of any considerable importance, from such natural catastrophes as hurricanes, earthquakes, and volcanic eruptions.

Pacific Islands. Perhaps the most characteristic commercial product of the islands of the Pacific, which are sometimes grouped under the name of Oceania, is copra (cp. p. 69). This is a leading product—in some cases practically the only product for commerce—of a majority of the principal islands, including New Guinea, Samoa, New Caledonia, Fiji, and Tahiti. But some of the islands have a considerable variety of cultivation. The familiar fruits include bananas in Fiji, oranges in Tahiti, grapes and pineapples in New Caledonia, &c. Fruits are also an export of considerable value from the Hawaiian Islands, but nine-tenths of the produce (by value) sent from this group to the United States consists of sugar. This crop is also of some importance in Fiji and New Caledonia. Coffee appears in New Guinea, New Caledonia, the New Hebrides, Hawaii, &c. Some of the islands, especially New Guinea and others in its neighbourhood, supply such forest products as sandal-wood; rubber planting has been tried there, in Samoa, in New Caledonia and elsewhere. Characteristic sea products which appear in commerce include mother-of-pearl, turtle-shell, and trepang. Some of the islands possess mineral wealth. Gold is worked in the British territory in New Guinea, and is at least known in the German. New Caledonia yields chiefly nickel and chrome. Sulphur occurs in the New Hebrides. Phosphates are the chief export from the Marshall Islands.

STATISTICAL TABLES

TABLE I

General Statistics

For various Countries.

Area = Thousands of square miles and nearest hundred (thus, 121,4 = 121,400 sq. m.).
Population = Millions and nearest hundred thousand (thus, 45,2 = 45,200,000).
Railways = Mileage (round figures).
Waterways = Inland waterways: mileage.
Shipping = Merchant shipping: thousands of tons.
Imports and Exports = Annual value, £ sterling, million and nearest hundred thousand (generally five years' average). Thus, 629,8 = £629,800,000.

Country.	Area.	Population.	Railways.	Waterways.	Shipping.	Imports.	Exports.
United Kingdom . .	121,4	45,2	23,300	5000	11,586	629,8	487,8
Norway	124,1	2,4	1900	—	1,581	18,8	11,9
Sweden	172,8	5,5	8400	—	778	35,0	32,0
Denmark	15,6	2,6	2100	—	547	39,7	32,4
Russia	8,647,6	160,1	45,000	151,500	720	86,0	108,0
Germany	208,8	65,0	37,000	8600	2,860	426,4	341,3
Holland	12,5	5,9	1900	1900	512	229,3	168,7
Belgium	11,4	7,5	2900	1300	187	139,0	193,0
France	207,0	39,4	30,000	7500	1,452	243,9	217,5
Switzerland . . .	15,9	3,7	3100	—	—	64,4	45,4
Austria-Hungary .	241,3	49,4	26,400	7200	500	101,5	97,1
Rumania	50,7	6,9	2200	—	150	15,3	18,7
Bulgaria	24,4	4,3	1080	—	—	5,1	4,8
Portugal	9,2	1,5	1700	—	121	14,0	6,6
Spain	194,7	19,5	9000	—	735	36,0	34,0
Italy	110,5	34,6	10,600	—	1,020	100,6	72,0
Greece	25,0	2,7	840	—	458	5,7	4,3
Turkey	1,565,0	35,4	4000	—	272	6,6	4,0
Egypt	400,0	11,1	1400	—	—	24,6	24,6
Algeria	343,5	5,2	2000	—	—	21,1	13,3
Canada	3,729,6	7,2	24,100	2700	719	65,2	56,2
Newfoundland . .	162,7	0,2	680	—	149	2,2	2,4
United States . .	2,974,1	91,3	238,300	—	6,500	$1,347,0	$1,750,9
Argentina	1,135,8	7,0	16,600	—	130	59,3	68,1
Chile	292,5	3,3	3280	—	117	18,8	21,7
South Africa (British)	473,2	5,2	7200	—	—	36,4	51,1
Australia	2,974,6	4,4	15,500	—	275	47,2	65,8
New Zealand . . .	104,7	0,9	2750	—	151	15,7	17,9
India	1,766,6	315,0	31,500	—	—	106,0	122,2
Ceylon	25,3	3,6	560	—	—	8,4	8,4
Straits Settlements, &c.	0,6	0,6	—	—	676	38,5	33,7

TABLE I (*continued*)

Country.	Area.	Population.	Railways.	Waterways.	Shipping.	Imports.	Exports.
Malay Archipelago (Dutch)	736,4	38,0	1500	—	—	21,1	32,4
Siam	195,0	6,3	650	—	—	5,0	7,0
French Indo-China	256,0	16,3	800	—	—	9,5	10,5
China	4,277,2	439,2	3000	—	—	61,9	39,4
Japan	175,5	51,0	5000	—	1,177	45,7	44,1
Persia	628,0	9,5	8	—	—	7,3	6,0
British Possessions in							
W. Africa	430,0	15,0	700	—	—	7,3	7,0
E. Africa	320,0	8,0	600	—	—	1,2	1,0
Rhodesia	435,0	1,9	2300	—	—	3,0	3,0
Mauritius	0,7	0,4	130	—	—	1,2	2,3
French African Possessions (excluding Algeria)	4,080,0	19,0	2100	—	—	7,5	8,0
German African Possessions	930,0	14,0	1500	—	—	5,0	3,0
Brazil	3,219,0	21,5	12,180	8,200	183	41,2	58,1
British Guiana	90,2	0,3	90	—	—	1,7	1,7
Venezuela	394,0	2,7	490	11,000	—	2,0	3,1
Colombia	435,1	4,3	5000	9000	—	2,5	3,0
Ecuador	116,0	1,4	300	—	—	1,8	2,4
Peru	695,7	4,5	1400	—	—	5,0	5,6
Bolivia	605,4	2,0	400	—	—	3,0	3,9
Uruguay	72,2	1,1	1400	1000	—	7,3	7,8
West Indies (British)	13,0	1,7	280	—	—	8,0	7,5
Cuba	44,0	2,2	630	—	—	18,4	26,0
Mexico	767,0	15,1	15,300	—	—	21,4	24,9
Central American Republics	200,0	5,2	1250	—	—	6,0	8,0

TABLE II

TABLE OF PRINCIPAL IMPORTS INTO THE UNITED KINGDOM.

According to value in millions of £, with the nearest hundred thousand. (Thus, the figures 248,3 signify £248,300,000.)

	Average of 5 years	From Foreign Countries.	From British Possessions.
	£	£	£
Food, Drink, and Tobacco	248,3	187,3	61,0
Out of which :—			
Grain and Flour	75,3	54,3	21,0
Meat	50,0	38,2	11,8
Other food and drink	120,2		
Out of which :—			
Butter	23,4	18,6	4,8
Sugar	20,5	19,3	1,2
Tea	10,8	1,2	9,6
Wine	3,9	3,7	0,2
Fish	3,5	2,2	1,3
Cocoa and Chocolate	2,8	2,0	0,8
Coffee	2,1	1,7	0,4
Fruit	10,8	9,1	1,7
Out of which :—			
Oranges	2,3	—	—
Apples	2,0	—	—
Bananas	1,8	—	—
Currants	1,4	—	—
Tobacco	4,7	4,6	0,1
Raw Materials and mainly Unmanufactured Articles	227,4	160,0	67,4
Out of which :—			
Cotton	62,8	60,6	2,2
Wool	34,0	7,4	26,6
Oils, &c.	30,6	19,6	11,0
Wood	25,7	20,6	5,1
Textiles (except cotton and wool)	14,7	7,3	7,4
Rubber	13,8	11,2	2,6
Hides, &c	11,2	5,7	5,5
Metallic ores (except Iron)	9,0	6,8	2,2
Iron and Steel	6,0	(practically all)	—
Wholly or mainly Manufactured Articles	151,7	133,0	18,7
Out of which :—			
Textile	42,4	37,6	4,8
Metal (not iron)	26,1	16,2	9,9
Leather	11,5	8,2	3,3
Chemicals, Drugs, Dyes	10,7	9,4	1,3
Machinery, Motor Cars, &c.	9,6	9,5	0,1
Iron	8,0	(practically all)	—
Paper	5,8	5,6	0,2

Total Imports from Foreign Countries	482,2
,, ,, ,, British Possessions	147,6
Grand Total of Imports	629,8

TABLE III

TABLE OF PRINCIPAL EXPORTS OF PRODUCE AND MANUFACTURES OF THE UNITED KINGDOM.

In millions of £, with nearest hundred thousand.

	Average of 5 years.	To Foreign Countries.	To British Possessions.
	£	£	£
Wholly or mainly manufactured Articles	316,5	199,0	117,5
Out of which :—			
Cotton Yarn and Fabrics	100,8	60,2	40,6
Iron and Steel, and Manufactures	41,0	24,6	16,4
Machinery, Carriages, &c.	36,0	20,2	15,8
Woollen Yarn and Fabrics	32,3	23,6	8,7
Chemicals, Drugs, Dyes	16,8	12,1	4,7
Textiles (not cotton or wool)	14,7	11,2	3,5
Apparel	10,0	2,7	7,3
Metal (not iron)	9,9	6,6	3,3
Ships	8,8	7,3	1,5
Cutlery, Hardware, &c.	5,9	3,1	2,8
Raw Materials, &c.	51,3	48,3	3,0
Out of which :—			
Coal	38,0	36,5	1,5
Food, Drink, and Tobacco	22,8	13,5	9,3

Total Exports to Foreign Countries	265,1
„ „ „ British Possessions	132,3
Grand Total of Exports of *Home* Produce	397,4

TABLE IV

UNITED KINGDOM: IMPORTS AND EXPORTS.

On an average annually during 5 years,

I. Merchandise was Imported (and not re-exported) into the United Kingdom from—	To the value (omitting 00,000) of	II. Produce of the United Kingdom was Exported to—	To the value (omitting 00,000 of)
	£		£
United States	114,9	India	47,2
Germany	54,4	Germany	35,5
France	38,8	United States	28,8
Russia	33,5	Australia	23,7
Argentina	28,5	France	21,9
India	26,6	Argentina	18,2
Canada	24,8	Canada	15,6
Australia	20,3	South Africa	15,0
Denmark	18,0	Italy	13,0
Belgium	16,9	Netherlands	12,2
Netherlands	16,1	Russia	11,1
Egypt	15,8	Japan	10,6
New Zealand	14,0	Belgium	10,3
Spain	13,8	China	10,1
Sweden	10,4	Brazil	10,1
Switzerland	7,1	Egypt	9,0
Norway	5,9	New Zealand	8,1
Italy	5,7	Turkey	7,8
Austria-Hungary	5,4	Sweden	6,1
Chile	4,7	Chile	5,4
Brazil	4,6	Denmark	5,0
Turkey	4,6	Spain	4,9
South Africa	4,0	Norway	3,9
Straits Settlements, &c.	3,6	Austria-Hungary	3,8
Ceylon	3,3	Straits Settlements, &c.	3,6
Rumania	3,2	Portugal	2,5
Japan	2,9	Switzerland	2,5
Portugal	2,5	West Indies	2,3
China	2,4	Mexico	2,2
Peru	2,4	Nigeria	2,0
Mexico	2,2	Ceylon	1,8
Greece	1,9	Rumania	1,8
West Indies	1,7	Philippine Islands	1,8
Cuba	1,4	Cuba	1,8
Canary Islands	1,3	Greece	1,6
Nigeria	1,1	Peru	1,4
Philippine Islands	1,1	Canary Islands	1,0

The above tables do not include the value of gold and silver. The imports of gold bullion averaged in annual value £39,700,000, almost wholly from British Possessions, and to the extent of 73 per cent. from the Transvaal. The imports of silver bullion averaged in annual value £11,400,000, almost wholly from foreign countries, excepting, in later years, a considerable import from Canada. Nearly 90 per cent. came from the United States. The figure for South African imports also omits the value of diamonds = £7,600,000.

INDEX

Index-references thus, **120**, under the names of the principal countries, are to the topographical sections giving general descriptions of their commerce, industries, &c. The index-references to important products may be supplemented by turning to the appropriate topographical sections.

Aberdeen, 158.
Abyssinia, 15, 214.
Adelaide, 205.
Afghanistan, 132, 213.
Alabama, 197.
Alaska, 14, 26, 30, 76.
Alberta, 193.
Alexandria, 192.
Alfa, *see* Esparto.
Algeria, 192, 222.
Algiers, 192.
Alicante, 186.
Allspice, 69.
Almaden, 187.
Alps, 127, 130.
Alsace, 173.
Altona, 113, 115.
Aluminium, 86, 157.
Amazon region, 12.
Amazon, river, 100.
Amber, 53.
Amsterdam, 108, 176.
Amsterdam, U.S.A., 197.
Amuria, 14.
Andes, 132.
Angola, 214.
Anthracite, 89.
Antigua, 220.
Antwerp, 113, 115, 176.
Appenzell, 180.
Apple, 44, 224.
Arabia, 15, 212.
Argentina, 14, **200**, 217, 222, 226; pastoral, 47; railways, 125; wheat, 38, 39, 139.
Arkansas, 197.
Arkhangel, 165, 169.
Arrack, 69.
Arrowroot, 67.
Artesian wells, 142.
Asia Minor, 190.
Asphalt, 87.
Assam, 207.
Assuan dam, 145.
Astrakhan, 169.
Athens, 190.
Atlantic, 108, 116.
Attar of roses, 184, 191.
Auckland, 205.
Augsburg, 172.
Australia, 9, 15, 200, **203**, 222, 226; forests, 52; pastoral, 47; railways, 124; wheat, 33, 40, 139.
Australian region, 80.
Austria, 14, 49.
Austria-Hungary, **118**, 222, 226.

Bagdad railway, 127.
Bahamas, 220.
Baikalia, 12.
Baku, 166.
Balkan lands, 15, 51, 183, 189.
Ballarat, 204.
Baltimore, 114.
Baluchistan, 15, 213.
Banana, 68, 224.
Banka, 211.
Barcelona, 187.
Barley, 41, 63.
Basel, 180.
Batum, 167.
Bauxite, 86, 199.
Bavaria, 172, 173.
Bêche-de-mer, 77.

Beet-sugar, *see* Sugar.
Beirut, 191.
Belfast, 159.
Belfort, 178.
Belgian Congo, 214.
Belgium, 14, 174, 222, 226; railways, 124.
Benares, 208.
Bendigo, 204.
Bengal, 207.
Bergen, 108, 162.
Berlin, 173.
Bilbao, 188.
Billiton, 211.
Birds (edible nests), 211.
Birkenhead, 112.
Birmingham, 154.
Black earth districts, 36.
Black Forest, 173.
Blyth, 112.
Bochum, 172.
Bogotá, 219.
Bohemia, 182.
Bolivia, 14, 59, 219, 223.
Bombay, 115, 208.
Bonanza farms, 39, 140.
Borax, 87.
Bordeaux, 179.
Borneo, 211.
Boston, 113.
Brazil, **217**, 223, 226.
Bremen, 113.
Brenner, 130.
Breslau, 172.
British Columbia, 14, 31, 193.
British Empire (commerce), 159, 224, 226.
British Isles, 14, **148**, 222, 224, 225; coal, 88; iron, 90; railways, 124, 126; shipping, 110; textiles, 93; wheat-supply, 34, 138, 141, 160.
Brockton, 197.
Broken Hill, 204.
Bruges, 176.
Buckwheat, 43.
Buenos Aires, 201.
Buffalo (city), 141.
Bulgaria, **183**, 222.
Burma, 15, 206, 208.
Burra Burra, 204.
Butter, 224, and *see* Dairy Produce.
Cadiz, 187.
Calcutta, 208.
Caledonian Canal, 157.
Caledonian Railway, 158.
California, 196.
Cambric, 54.
Camphor, 58.
Canada, 14, 30, **192**, 222, 226; immigration, 136; pastoral, 47; railways, 125; wheat, 37, 39, 139.
Canals, 102, 119, 145, 157.
Canary Islands, 226.
Candles, 55, 88.
Canstatt, 172.
Canvas, 54.
Cape-to-Cairo railway, 215.
Cape of Good Hope, 15, 118, 202.
Cape Town, 203.
Cardiff, 112.
Carolina, N. and S., 96.
Carpets, 191, 208, 212.
Cartagena, 187.
Cassava, 67.
Castilloa tree, 74.
Castor-oil, 64.
Cattle, 47.
Caucasus, 131.
Caviare, 76, 169.
Cedar, 72.
Ceylon, 207, 222, 226.
Chalon-sur-Saône, 178.
Charleroi, 175.
Chemnitz, 172.
Chenab Canal, 145.
Cheshire salt works, 97.
Chicago, 140, 198.
Chile, 14, 31, 59, 201, 222, 226.
China, 12, 31, 77, 84, **208**, 223, 226.
China grass, 71.
Chipping, in place-names, 135.
Chocolate, 67, 224.
Christchurch, 205.
Cinchona, *see under* Quinine.
Cinnamon, 69.
Circle City, 27.
Climate, 7, 97, 147.
Cloves, 69.
Clyde, 112.
Clyde-Forth lowland, 157, 158.

Coal, 88, 152, 225.
Cobalt, 86.
Cobar, 204.
Cocoa, 67, 224.
Cocoa-butter, 67.
Coco-nut, 68.
Coffee, 66, 224.
Cohoes, 197.
Coir, 69, 72.
Cold storage, 48.
Cologne, 173.
Colombia, 102, 219, 223.
Colorado, 196.
Congo, river, 101.
Constantinople, 191.
Coolgardie, 83, 204.
Coolie, 137.
Coorg, 207.
Copenhagen, 165.
Copper, 85.
Copra, 69, 220.
Coral, 77.
Cork, 159.
Cork oak, 186.
Corn, *see* Maize.
Cotton, 54, 70, 96, 224, 225.
Coventry, 154.
Creosote, 52.
Crinan Canal, 158.
Cryolite, 24.
Cuba, 220, 223, 226.
Currant, 46, 190, 224.

Dairy produce, 47.
Dakota, N. and S., 195.
Dammar, 74.
Danube, 173, 183.
Danzig, 113.
Date-palm, 68.
Dawson City, 27.
Demerara, 218.
Denmark, 14, **164**, 222, 226.
Diamonds, 86, 202.
Doubs, 173.
Dover, 113, 115.
Drave, river, 183.
Duluth, 140.
Dundee, 26, 158.
Dunedin, 205.
Dunkirk, 179.
Durban, 203.
Durra, 64.
Düsseldorf, 173.

Ebonite, 73.
Ebony, 72.
Ecuador, 15, 219, 223.
Eger, 182.
Egypt, 41, 106, 142, **191**, 222, 226.
Ekaterinoslav, 166.
Elba, 189.
Elbe, 113, 173, 183.
Elberfeld-Barmen, 94, 173.
Electricity, 92.
Emeralds, 86.
Emigration, 136.
England, 75, 84, **148**; *see also* British Isles.
Entrepôt trade, 111.
Epinal, 178.
Erie Canal, 106, 113.
Erie, lake, 104.
Esbjerg, 165.
Eskimo, 21, 22.
Esparto, 56.
Essen, 172.
Ethiopian region, 80.
Eucalyptus, 52.

Fairs, 134.
Fall river, 197.
Famine, 146.
Feathers, 81.
Fig, 46.
Fiji, 221.
Fisheries, 24, 74, 150, 193.
Fiume, 183.
Flax, 53, 64.
Florence, 189.
Flowers, 47.
Flushing, 176.
Forests, 17, 49, 72 (and *see* countries).
Forth, Firth of, 158.
Fort William, 140, 194.
France, 14, 51, **177**, 222, 226; railways, 125, 126; wheat, 39.
French Indo-China, 15, 206, 223.
Fruit, 44, 68, 224.
Furs, 28, 80.

Galveston, 113.
Galway, 159.
Garonne river, 179.
Gas, natural, 88.
Gellivara, 28, 163.
Geneva, 181.
Genoa, 189.
German East Africa, 214.
Germany, 14, **169**, 222, 226; coal, 88; railways, 125, 126; shipping, 110; wheat, 39.
Ghats, 207.
Ghent, 175.
Gingelly, *see* Sesamum.
Ginger, 69.
Glasgow, 112, 158.
Glasgow and South-Western Railway, 158.
Glass, 182, 189.
Glove-making, 154.
Gloversville, 197.
Gold, 26, 84.
Gold Coast, 214.
Göta Canal, 164.
Gothenburg, 164.
Grain trade, 138, 224.
Gram, 64.
Grand Trunk Pacific Railway, 124, 194.
Grangemouth, 158.
Great Central Railway, 156.
Great circle sailing, 118.
Great Eastern Railway, 156.
Great Lakes, 104, 141, 194.
Great Northern Railway, 154.
Great Northern Railway (Ireland), 159.
Great North of Scotland Railway, 158.
Great Southern and Western Railway, 159.
Great Western Railway, 156.
Greece, **189**, 222, 226.
Greenheart, 72.
Greenland, 12, 21, 22.
Greenock, 158.
Grenada, 220.
Grimsby, 112, 150.
Guiana, 8, 15, 218, 223.
Guatemala, 219.
Guinea corn, *see* Sorghum.
Gum arabic, 74.
Gunny-cloth, 71.
Hadramut, 212.
Halifax, 194.
Halifax (N.S.), 116.
Hamburg, 108, 113, 115, 116.
Hamilton, 194.
Hammerfest, 21.
Hangchow, 209.
Hanseatic League, 108.
Harbours, 114.
Hats, Panama, 219.
Havre, 178, 179.
Hawaiian Islands, 221.
Hawaiian region, 80.
Helsingfors, 169.
Hemp, 53.
Henequen, 71.
Highland Railway, 158.
Himalaya, 132.
Hindu Kush, 132.
Hobart, 205.
Holarctic region, 79.
Holland, 14, 124, **174**, 222, 226.
Honey, 43.
Hops, 46.
Horn, Cape, 118.
Hudson, river, 104, 113, 115.
Hudson's Bay Company, 30.
Hull, 112.
Hungary, 15 (and *see* Austria-Hungary).
Huron, lake, 104.

Iceland, 14, 20, 22.
Illawarra, 204.
Illinois, 196.
India, 9, 12, 15, 58, **205**, 222, 226; cotton, 70; irrigation, 143, 145; railways, 124, 132; rice, 59; wheat, 64, 139.
Indiana, 195.
Indian corn, *see* Maize.
India-rubber, *see* Rubber.
Indigo, 74.
Iodine, 79.
Iowa, 196.
Iran, 12.
Ireland, 31, 94, 96, **159**; *see also* British Isles.
Iron, 90, 224, 225.
Irrigation, 39, 142, 191, 211.

Isinglass, 78.
Italy, 15, **188**, 222, 226.
Ivigtut, 22.
Ivory, 28, 215.

Jamaica, 220.
Japan, 14, 32, 75, 76, **209**, 223, 226.
Jarrah, 52.
Java, 211.
Jerez, 186.
Jerked beef, 48.
Juneau, 27.
Jute, 71.

Kaiser Wilhelm Canal, *see* Kiel Canal.
Kalahari, 15.
Kalgoorlie, 204.
Kamchatka, 12.
Kamerun, 214.
Kansas, 195.
Karachi, 208.
Kashmir, 208.
Kauri pine, 52.
Kelp, 79.
Kentucky, 197.
Kiel Canal, 113.
Kiev, 165.
Kimberley, 202.
Kirunavara, 28, 163.
Klondike, 26.
Kobé, 211.
Kolar, 207.
Korea, 14.
Krefeld, 173.
Kristiania, 162.
Kwen-lun, 132.

Labrador, 14, 20, 24, 27, 30.
Lancashire, 94.
Lancashire and Yorkshire Railway, 156.
La Plata, 201.
Lapps, 21.
Laurium, 190.
Lawn, 54.
Lead, 85.
Leather, 79.
Le Creusot, 178.
Leiden, 175.
Leith, 113, 158.
Liége, 175.
Lignite, 89.
Lille, 178.
Limburg, 175.
Limerick, 159.
Limoges, 179.
Linen, 54.
Liner, 111.
Linseed, *see* Flax.
Lisbon, 188.
Liverpool, 112, 115.
Locusts, 147.
Lodz, 166.
Loire, river, 179.
London, 111, 115, 148.
London, Brighton, and South Coast Railway, 156.
London and North-Western Railway, 156.
London and South-Western Railway, 156.
Londonderry, 159.
Lötschberg, 130.
Louisiana, 196.
Lowell, 197.
Lowestoft, 150.
Lübeck, 108, 113.
Luleå, 164.
Luossavara, 28.
Luton, 154.
Luxemburg, Grand-duchy, 175.
Lynn, Mass., 96, 197.
Lyons, 178.

Macaroni, 188.
Madagascar, 15, 215.
Madras, 208.
Magdalena, river, 102.
Magellan Straits, 108.
Mahogany, 72.
Main, river, 173.
Mainz, 173.
Maize, 43, 63.
Malaga, 186, 187.
Malagasy region, 80.
Malaria, 213.
Malay Archipelago, **211**, 223.
Malay region, 12.
Manchester, 112, 115.

Manchester, N.H., 197.
Manchester Ship-Canal, 115, 121.
Manchuria, 15.
Manilla hemp, 71.
Manioc, 218.
Manitoba, 193.
Manufactures, distribution, 91.
Maple sugar, 47.
Markets, 184.
Marne, river, 173, 179.
Marseilles, 179.
Marshall Islands, 221.
Maryland, 196.
Massachusetts, 197.
Maté, 66.
Mauritius, 215, 223.
Meat, 47, 198, 224.
Mediterranean, 77, 106.
Mediterranean region, 79; (Europe), 185.
Melbourne, 205.
Memel, 173.
Mersey, 112, 115.
Mesopotamia, 41, 190.
Methil, 158.
Meuse, river, 173, 175, 179.
Mexico, 15, 219, 223, 226.
Michigan, 196.
Michigan, lake, 104.
Middlesbrough, 112.
Midi, Canal du, 179.
Midland Great Western Railway, 159.
Midland Railway, 154.
Migration, 135.
Millet, 44, 64.
Minerals, distribution, 81.
Minneapolis, 140.
Minnesota, 195.
Mississippi, 104, 197, 198.
Missouri, 196.
Mohair, 191.
Moldau, river, 183.
Monazite, 218.
Mongolia, 12, 15.
Mons, 175.
Monsoons, 143, 205.
Mont Cenis, 130.
Montevideo, 201.
Montreal, 194.
Montserrat, 220.
Moonta, 204.
Morocco, minerals, 84.
Morphia, *see* Opium.
Mosquito, 213.
Mother-of-pearl, 77.
Mountains, 130.
Mulberry, 56.
Mülhausen, 172.
Murchison, 204.
Mustard, 64.
Mysore, 207.

Nanking, 209.
Naples, 189.
Narvik, 28, 164.
Narwhal, 26.
Natal, 202.
Navigation, 98.
Nebraska, 195.
Neotropical region, 80.
Netherlands, *see* Holland.
Netherlands-India, *see under* Malay Archipelago.
New Bedford, 26.
New Brunswick, 193.
New Caledonia, 221.
Newcastle, 112.
Newcastle, N.S.W., 204.
Newfoundland, 14, 192, 222.
Newfoundland banks, 75, 76.
New Guinea, 15, 221.
New Hampshire, 197.
New Hebrides, 221.
New Orleans, 113.
Newport, 112.
New Waterway, 176.
New York, 113, 115, 196.
New Zealand, 14, 15, 31, 200, **203**, 222, 226; coal, 81; pastoral, 47; timber, 52; wheat, 33.
Nicaragua, 219.
Nickel, 86.
Nigeria, 226.
Nile, river, 101, 143, 144, 191.
Nitrate, 87, 201.
Nizhniy-Novgorod, 134.
Nome, 27.
North British Railway, 158.
North Carolina, 197.
North-Eastern Railway, 154.
Northern Territory (Australia), 9.
North Sea Canal, 176.
North Sea Fisheries, 75.
North Shields, 112.

Norway, 12, 20, 92, **162**, 222, 226; cereals, 41; coast, 114; fisheries, 76; railways, 125; shipping, 110.
Nova Scotia, 193.
Nuremberg, 173.
Nutmegs, 69.
Nyasaland, 214.

Oats, 42.
Ocean drainage basins, 106.
Oceania, *see* Pacific Islands.
Oder, 173.
Odessa, 87, 166, 169.
Ohio, 196.
Oil (animal), 25, 78; (mineral), 87, 166; (vegetable), 54, 55, 64.
Oise, river, 179.
Olive, 51, 188.
Omaha, 198.
Ontario, 193.
Ontario, lake, 104.
Opals, 86, 182.
Opium, 57.
Oporto, 186, 188.
Oran, 192.
Orange, 46, 68, 224.
Oregon, 196.
Oriental region, 80.
Osaka, 211.
Ostend, 176.
Ostrich, 81, 215.
Outports, 116.
Overysel, 175.
Ozokerite, 88.

Pacific Islands, 220.
Palm-cabbage, 69.
Palm oil, 214.
Pamirs, 132.
Pampas, 47.
Panama Canal, 120, 214.
Paper, 53, 56, 224.
Paraffin, 88.
Paraguay, 201.
Paris, 178, 179.
Park-lands, 19.
Pear, 45.
Pearl fisheries, 77.
Pemba, 214.
Pennsylvania, 196.
Pepper, 69.
Persia, 15, 211, 223.
Perth, W.A., 205.
Peru, 14, 59, 219, 223, 226.
Peterhead, 26.
Petroleum, 87.
Philadelphia, 114, 197.
Philippine Islands, 15, 226.
Phoenicians, 107.
Phylloxera, 148.
Pig-iron, 91.
Pilsen, 182.
Pimento, *see* Allspice.
Pine-apple, 68.
Piraeus, 190.
Pitch, 52.
Pittsburg, 95.
Platinum, 86.
Po, river, 189.
Podolia, 165.
Poltava, 165.
Polynesian region, 30.
Port Arthur, 194.
Port Elizabeth, 203.
Ports, 111.
Port Said, 192.
Portugal, 15, **186**, 222, 226.
Portuguese East Africa, 202.
Potatoes, 46.
Potteries, 97.
Prague, 183.
Prairies, 14, 47.
Precious stones, 86.
Pregel, 173.
Prince Rupert, 194.
Punjab, 206.
Pyrenees, 131.

Quebec, 193.
Queensland, 203.
Quicksilver, 86.
Quinine, 70.
Quito region, 12.

Rabbits, 148.
Rack railways, 131.
Railways, 100, 121, 123 (and *see* countries).
Raisins, 46.
Ramie, *see* China grass.
Rand, The, 202.
Raniganj, 207.

Redditch, 154.
Reichenberg, 182.
Regions of the world, 11.
Relief, relation with commerce, 11.
Réunion, 215.
Reval, 169.
Rhea, *see* China grass.
Rhine, river, 102, 108, 170, 173, 175, 179.
Rhineland, 171.
Rhodesia, 215, 223.
Rhone, river, 173, 179.
Rice, 59.
Riga, 108, 116, 166, 169.
Rio Tinto, 187.
Riouw, 211.
Rivers, 98.
Roads, 121.
Roman Empire, 107, 122, 142.
Rome, 189.
Rope, 54, 56.
Rosewood, 72.
Rostock, 113.
Rotterdam, 113, 176.
Roubaix, 178.
Rouen, 178.
Rubber, 72, 214, 224.
Rubies, 86.
Ruhr, river, 171.
Rumania, 15, **183**, 222, 226; wheat, 37, 139.
Rushden, 154.
Russia, 14, **165**, 222, 226; fisheries, 76; pastoral, 47; railways, 125; timber, 49; wheat, 84, 38, 139.
Rye, 43.

Saar, 171.
Sago, 68.
Sahara, 12, 216.
St. Anthony, Falls of, 198.
St. Etienne, 178.
St. Gall, 180.
St. Gotthard, 130.
St. John's, N.B., 194.
St. Lawrence, region, 12; river, 31, 76, 106, 116.
St. Louis, 198.
St. Petersburg, 166, 168.
St. Vincent, 220.
Saké, 62.
Salmon, 76.
Salt, 79, 86, 97.
Samoa, 221.
Samoyeds, 21.
San Francisco, 26, 114, 115.
Santander, 188.
Saône, 173.
Sapphires, 86.
Sardinia, 189.
Saskatchewan, 193
Sault Ste. Marie, 104.
Save, river, 183.
Scandinavia, 14, 31, 49, 53; and *see* Norway, Sweden.
Scheldt, river, 176.
Schiedam, 175.
Scotland, 31, **157**; *see also* British Isles.
Seal, 24.
Sea-otter, 25.
Seaweed, 79.
Seine, river, 173, 179.
Semmering, 130.
Sepia, 78.
Servia, **183**.
Sesamum, 64.
Severn, 157.
Sèvres, 179.
Shagreen, 79.
Shanghai, 209.
Shannon, 159.
Sheep, 47.
Sheffield, 94.
Shellac, 74.
Ship-canals, 119.
Shipping, 109.
Shoemaking, 97, 154.
Siam, 15, 206, 223.
Siberia, 12, 28, 30, **167**; wheat, 36.
Sicily, 188.
Silesia, 171.
Silk, 56.
Silk cotton tree, 71.
Silver, 85.
Silverton, 204.
Simplon, 130.
Sind, 208.
Singapore, 211.
Sisal hemp, *see* Henequen.
Sligo, 159.
Smeerenburg, 26.

Smyrna, 191.
Soap, 55.
Solingen, 95.
Somaliland, 15, 215.
Sonoran region, 79.
Sorghum, 47, 64.
South Africa (British), 124, 200, **202**, 222, 226; minerals, 82, 86.
Southampton, 112.
South Australia, 203.
South-Eastern and Chatham Railway, 156.
South Shields, 112.
Spain, 14, **186**, 222, 226.
Spices, 44, 69.
Spiked millet, 64.
Spitsbergen, 26, 28.
Sponges, 77.
Spree, river, 173.
Staffordshire, 97.
Starch, 62.
Stavanger, 162.
Steamer 'lanes', 119.
Steel, 91, 224, 225.
Stettin, 113, 116.
Stevenson Road, 216.
Stockholm, 164.
Straits Settlements, 222, 226.
Strawberry, 45.
Strawplaiting, 154, 189.
Suchow, 209.
Sudan, 12, 15, 58, 64, 214.
Suez Canal, 108, 116, 119, 192.
Sugar, 62, 224; beet, 47, 63.
Sulitelma, 28.
Sulphur, 199.
Sumatra, 211.
Sunderland, 112.
Superior, lake, 104.
Sussex, iron, 94.
Swansea, 112.
Sweden, 14, 92, **163**, 222, 226; iron, 28; railways, 125.
Switzerland, 92, **180**, 222, 226.
Syria, 15.

Tahiti, 221.
Tapioca, 67.
Tasmania, 14, 203.
Tay, Firth of, 158.
Tea, 65, 224.
Teak, 72.
Tell, The, 192.
Tennessee, 197.
Terneuzen, 176.
Texas, 196.
Thames, 115, 122, 157.
Theiss, river, 183.
Tian-shan, 132.
Tibet, 12, 59.
Tiflis, 131.
Tilburg, 175.
Tilbury Docks, 116.
Timber, 49, 72.
Tin, 86.
Tobacco, 56, 69, 224.
Toronto, 194.
Tortoiseshell, 77.
Tourcoing, 178.
Towns, positions, 133; growth, 138.
Tramp steamers, 111.
Trans-Siberian railway, 86, 129, 168.
Transvaal, 202.
Trautenau, 182.
Trent, 157.
Trepang, *see* Bêche-de-mer.
Triest, 183.
Trinidad, 220.
Trolhättan Falls, 164.
Trondhjem, 162.
Troy, 197.
Troyes, 179.
Tundra, 12, 21.
Tungsten, 199.
Tunisia, 192.
Turan, 12.
Turkey, 125, **189**, 222, 226.
Turpentine, 52.
Tweed, 158.
Tyne, 112.

Uganda Railway, 216.
Uncompahgre, 145.
United Kingdom, *see* British Isles.
United States, 14, 15, **194**, 222, 226; coal, 88; cotton, 96; fisheries, 75; immigration, 186; iron, 91; irrigation, 145; minerals, 82, 84; pastoral, 47; railways, 124, 126; shipping,

110; timber, 49, 52, 53; wheat, 87, 89, 139.
Ural Mountains, 82, 86, 166.
Uruguay, 201, 223.
Ust-Dvinsk, 169.
Utah, 196.
Utica, 197.
Utrecht, 175.

Val de Travers, 180.
Valencia, 187.
Valparaiso, 202.
Vancouver, 194.
Vanilla, 69.
Vegetable ivory, 74.
Vegetables, 46.
Venezuela, 15, 219, 223.
Venice, 107, 189.
Victoria, 203.
Vienna, 182.
Vine, 45.
Virginia, 196.
Visby, 108.
Vistula, 108, 168, 173.
Vizcacha, 148.
Vladikavkas, 181.
Vladivostok, 169.
Volga, 168.
Vorarlberg, 182.

Walrus, 26.
Warping, 143.
Warsaw, 166.
Washington, 196.
Water-power, 92.
Wax, Brazilian, 74.
Wellingborough, 154.
Wellington, 205.
Western Australia, 203.
West Indies, 15, 213, 220, 223, 226.
Westphalia, 171.
Whale, 25.
Wheat, 33, 63, 138.
Wine, 224, and *see* Vine.
Wood-tar, 52.
Wool, 48, 93, 224, 225.
Worms, 173.
Wupper, river, 94.
Württemberg, 172.

Yarmouth, 150.
Yellow fever, 213.
Yemen, 212.
Yeovil, 154.
Yokohama, 211.
Yorkshire, 93.
Yukon, 12, 26.

Zanzibar, 214.
Zinc, 86.
Zoological regions, 79.
Zürich, 180.
Zwickau, 173.

Oxford: Horace Hart M.A. Printer to the University

THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW

AN INITIAL FINE OF 25 CENTS

WILL BE ASSESSED FOR FAILURE TO RETURN THIS BOOK ON THE DATE DUE. THE PENALTY WILL INCREASE TO 50 CENTS ON THE FOURTH DAY AND TO $1.00 ON THE SEVENTH DAY OVERDUE.

MAR 4 1934
JAN 11 1947
MAR 8 1948
Aug17'48BS
3Jan'58GCA
JAN 3 1958 LU
SEP 1 8 1978
IN STACKS
MAR 1 8 1978
REC. CIR. MAY 2 6 '78

DEC

LD 21-100m-7,'33

YB 06026

283561
Howarth
HF1027
.H7
UNIVERSITY OF CALIFORNIA LIBRARY